Musical Hexagon

JEAN-YVES BEZIAU

UFRJ

Universidade Federal do Rio de Janeiro

Square / Hexagon of Opposition

- Logic
- But what is logic?
- Logos: reason, language, science, relation
- How to think - understanding/intelligence
- Rationalism / empirism

The square - 3 steps

- Aristotle (4 bc) : beyond dichotomy
- Apuleius/Boethius (2-4 ad): power of diagram
- Blanché (20 ad): hexagon

Robert Blanché

«Sur l'opposition des concepts», *Theoria, 19 (1953), pp.89-130.*

Structures Intellectuelles -

Essai sur l'organisation systématique des concepts, Vrin, Paris, 1966

square / hexagon - 3 features

- Logic
- Transdisciplinarity
- Structure

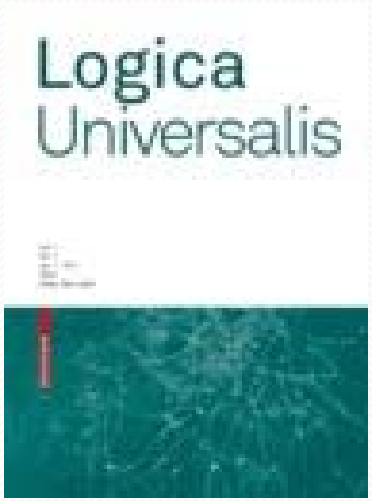
1st World Congress on the Square of Opposition

Montreux, Switzerland - June 2007

The Square of Jazz

Publications related to the first congress

- Special issue of the journal
  Birkhäuser-Springer
  Vol 2 – number 1 – 2008
  14 papers / 200 pages

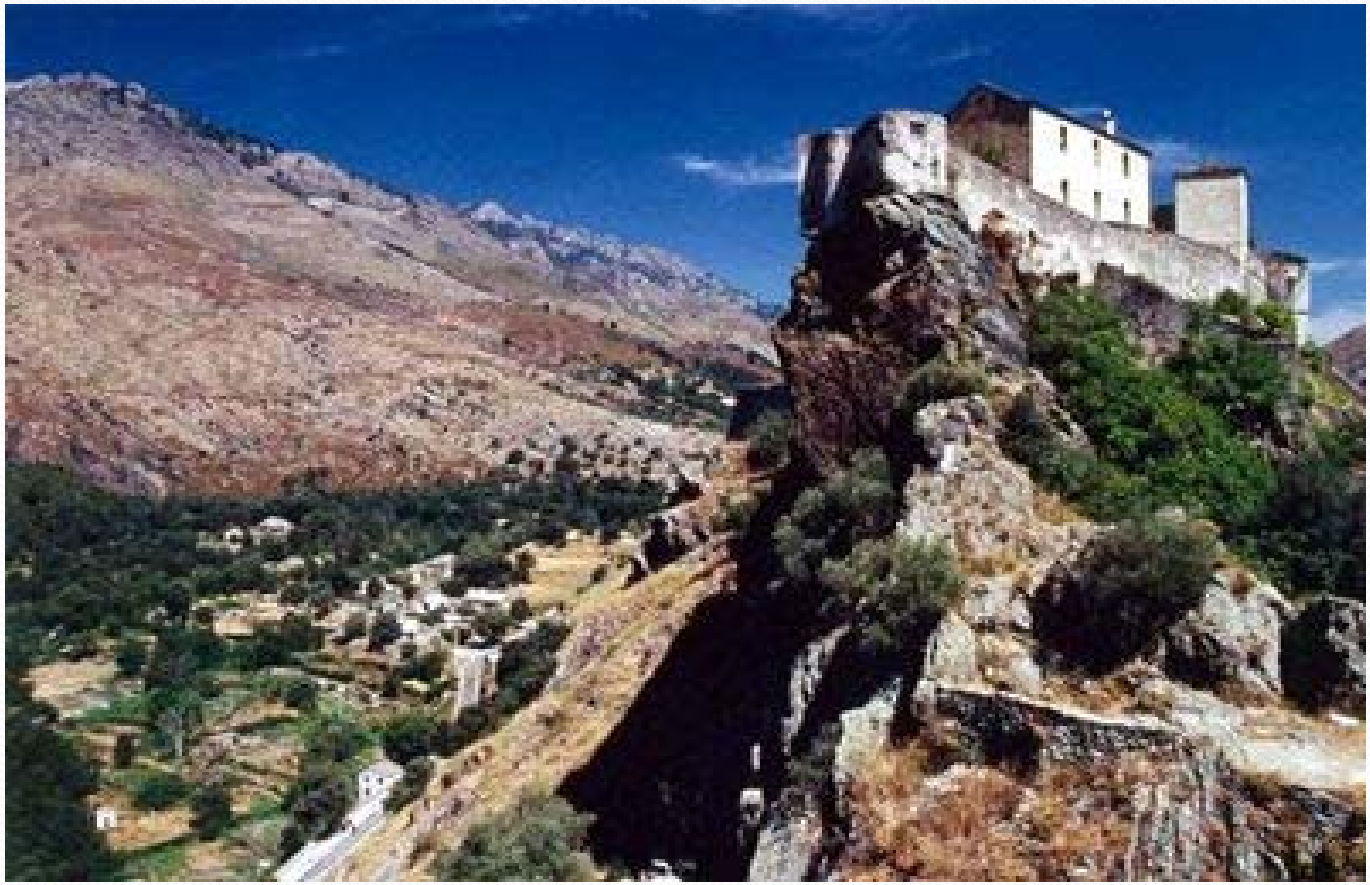


- Book: *New perspectives on the square of opposition*
  Peter Lang, Bern, 2010
  18 papers/500 pages + movie

PETER LANG
INTERNATIONALER VERLAG DER WISSENSCHAFTEN

Square of Salomé

2nd World Congress on the Square of Opposition

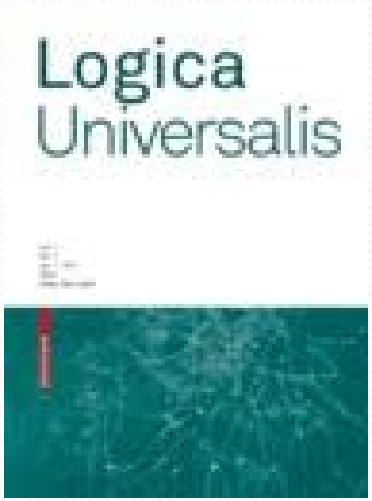


Corte, Corsica - June 2010


TAURANT

Publications related to the 2nd congress

- Special double issue of the journal
  Birkhäuser-Springer
  Vol 6 – number 1 – 2012
  15 papers / 250 pages



- Book: *Around and beyond the square of opposition*
  Birkhäuser, Basel, 2011
  25 papers/500 pages

Birkhäuser

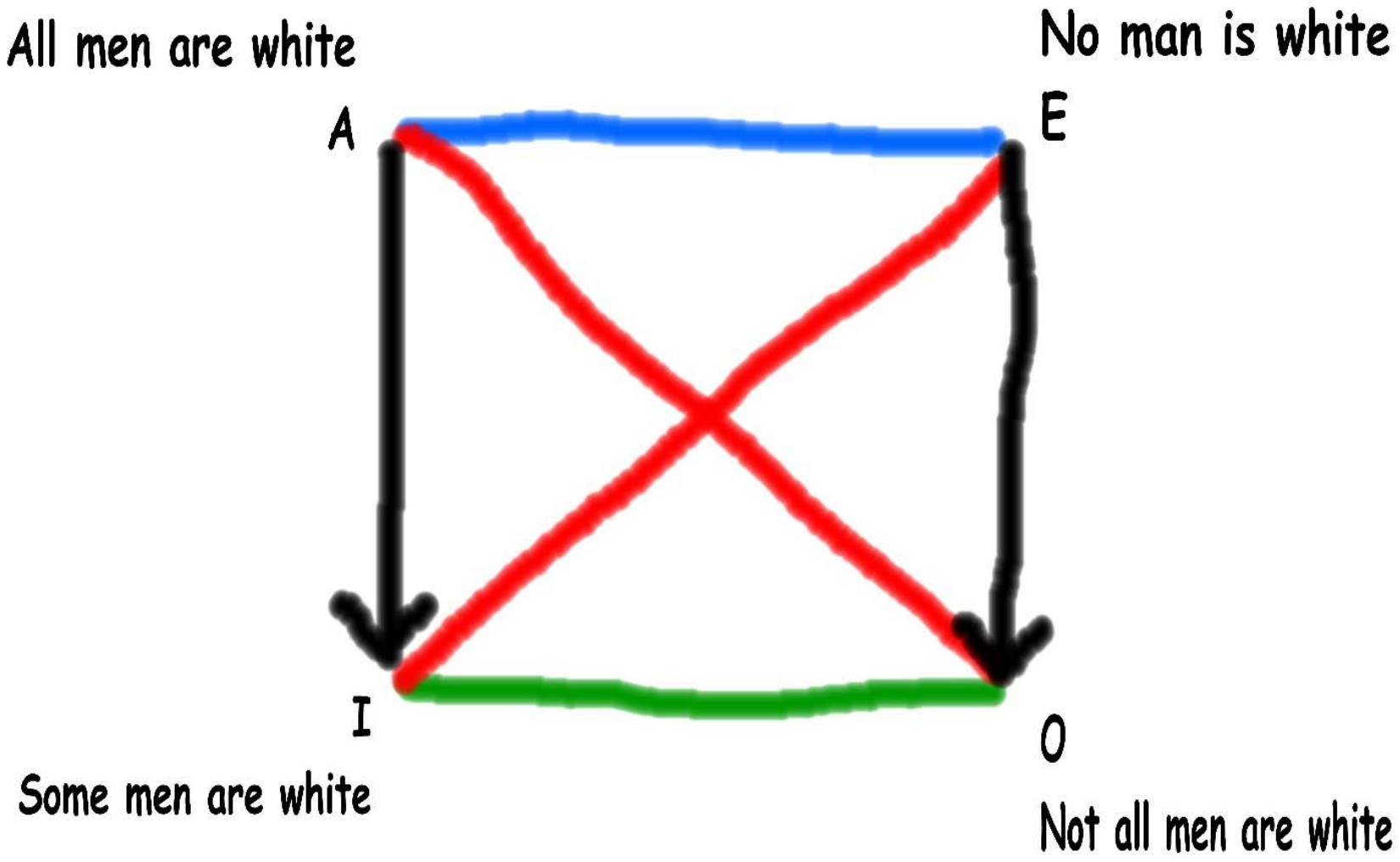
III WORLD CONGRESS ON THE SQUARE OF OPPOSITION

AUB American University of Beirut
الجامعة الأميركية في بيروت

June 26-29, 2012

http://www.square-of-opposition.org/

Square of Opposition



Contradictories

P and Q cannot be true together, cannot be false together

Contraries

P and Q cannot be true together, but can be false together

Subcontraries

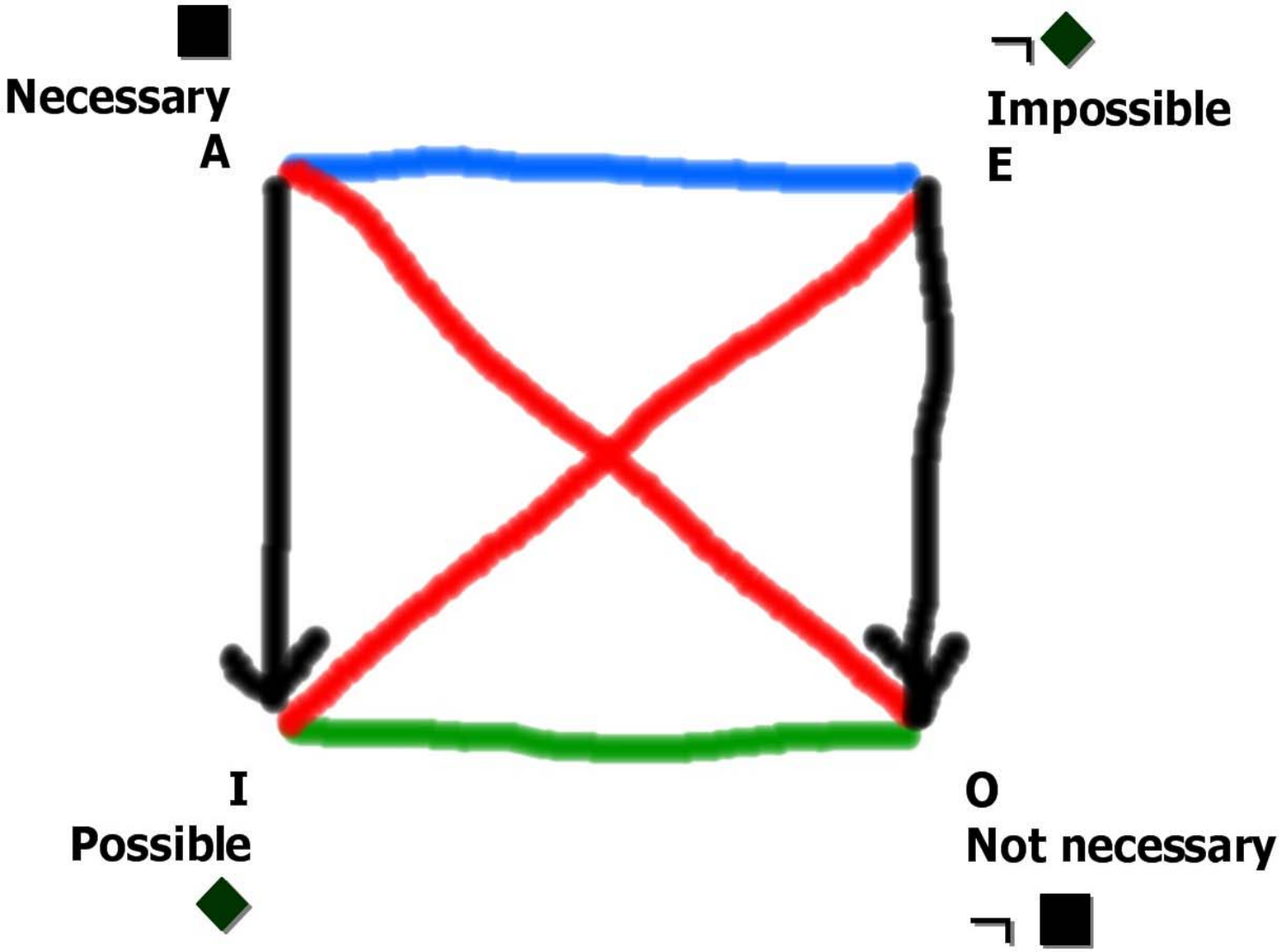
P and Q cannot be false together, but can be true together

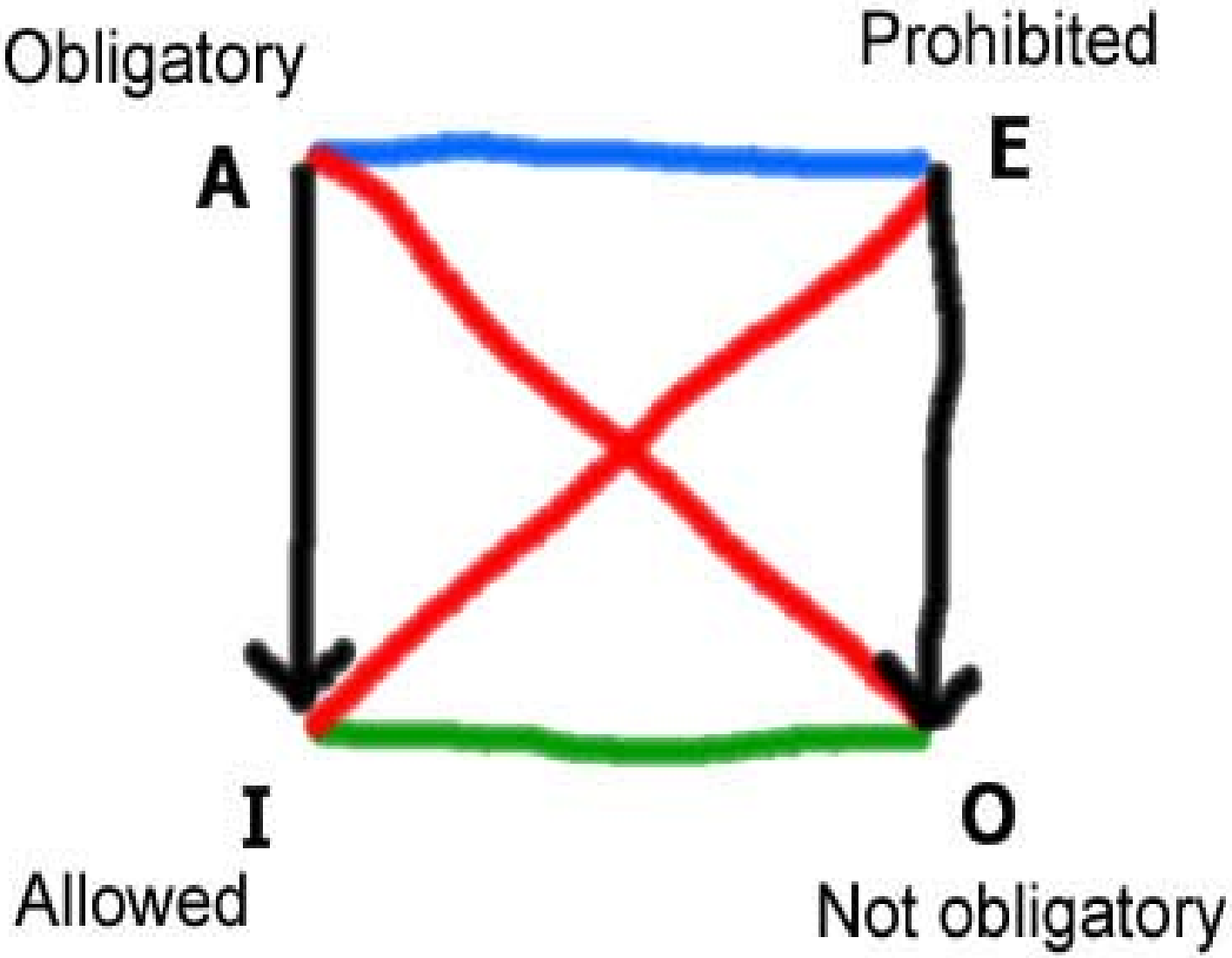
- The square is about quantifiers:

All – None – Some – Not All

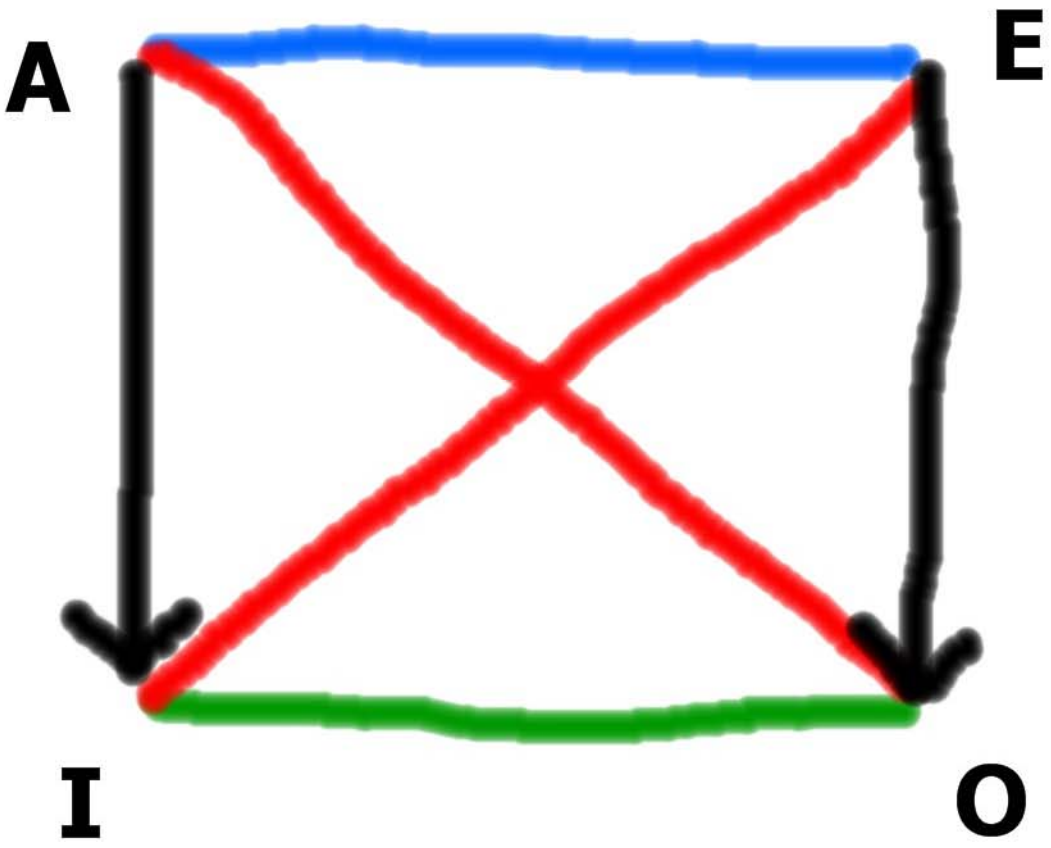
but it can be about many different notions

- It is about oppositions beyond dichotomy

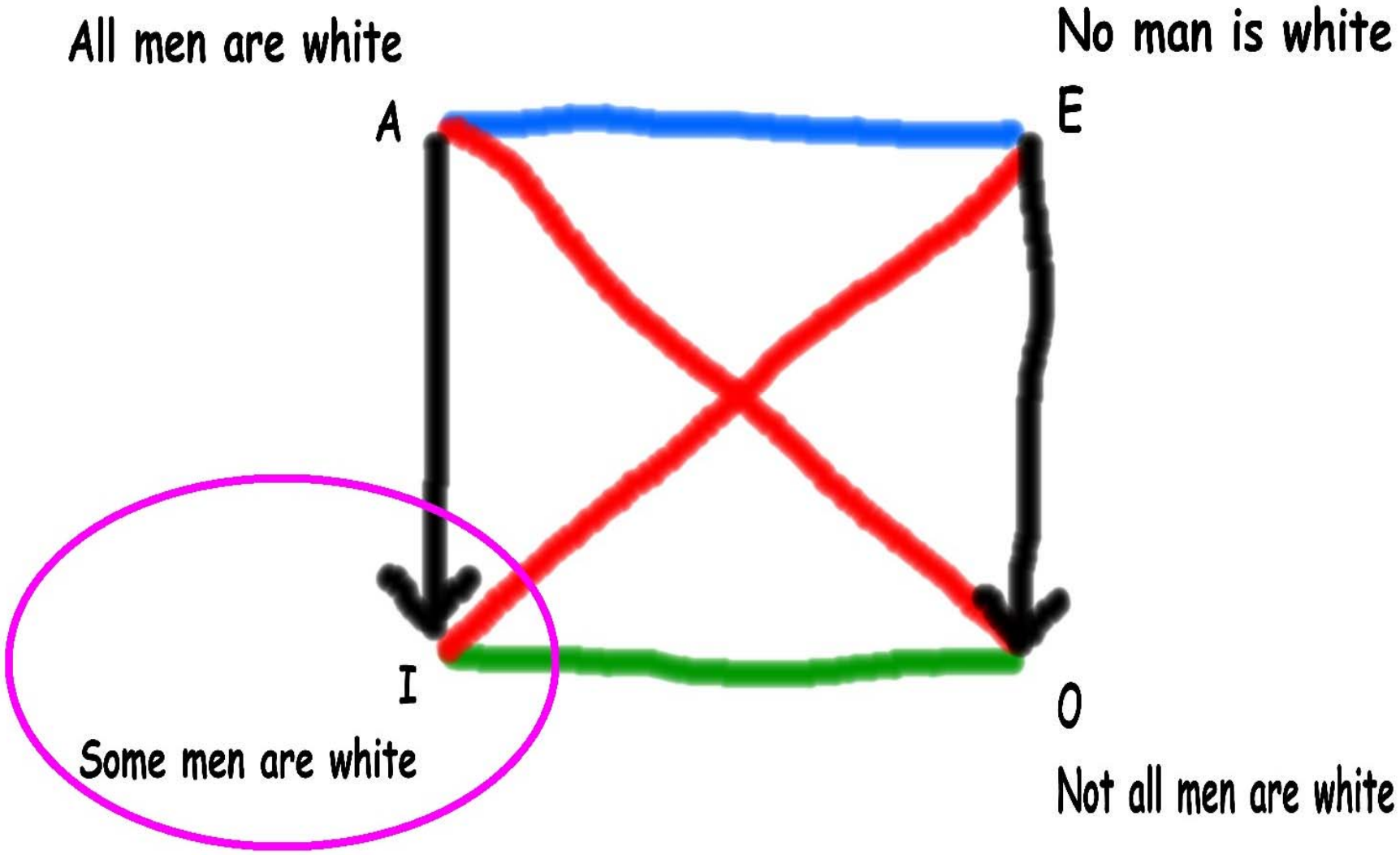

□
Necessary
A
¬◇
Impossible
E
I
Possible
◇
O
Not necessary
¬□


Obligatory
Prohibited
A
E
I
O
Allowed
Not obligatory

Corner Problems


A
E
I
O

Problem with the l-corner


All men are white
A
No man is white
E
I
Some men are white
O
Not all men are white

Some in the square is not some of natural language

- *Some* cats are blacks

- but *not all* cats are black

Some cats are black: NO!

Some cats are black: YES?

- Mathematics:
  some and maybe all
  = at least one

- Natural language /
  Empirical Sciences:
  some but not all

The tragedy of the square

- The some square is mathematical
- Aristotle is not mathematical

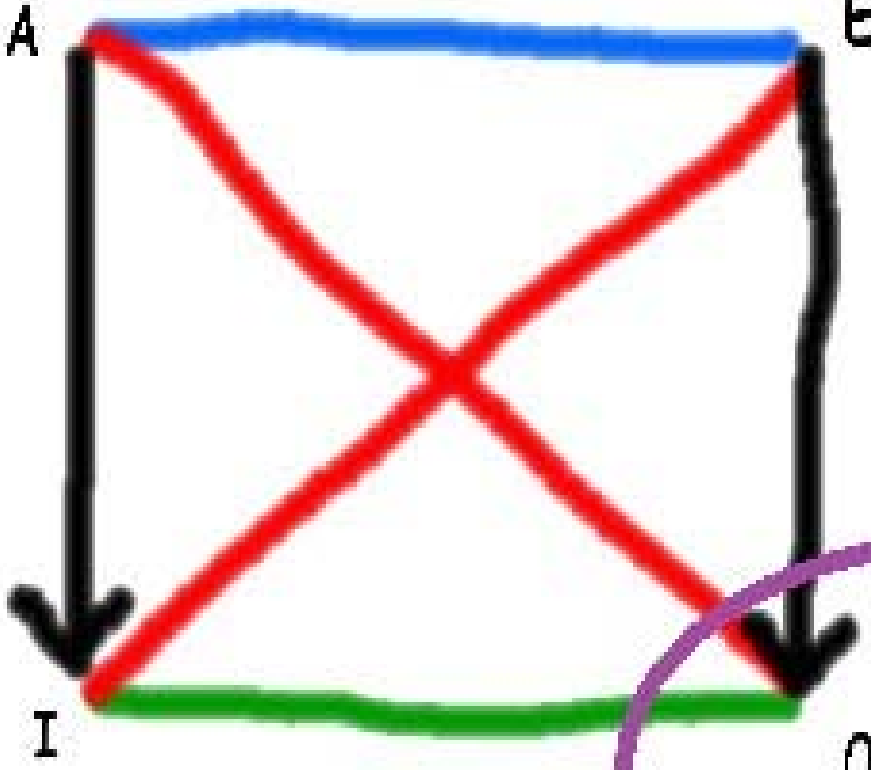
Problem with the O-corner

All men are white

A

No man is white

E



I

Some men are white

O

Not all men are white

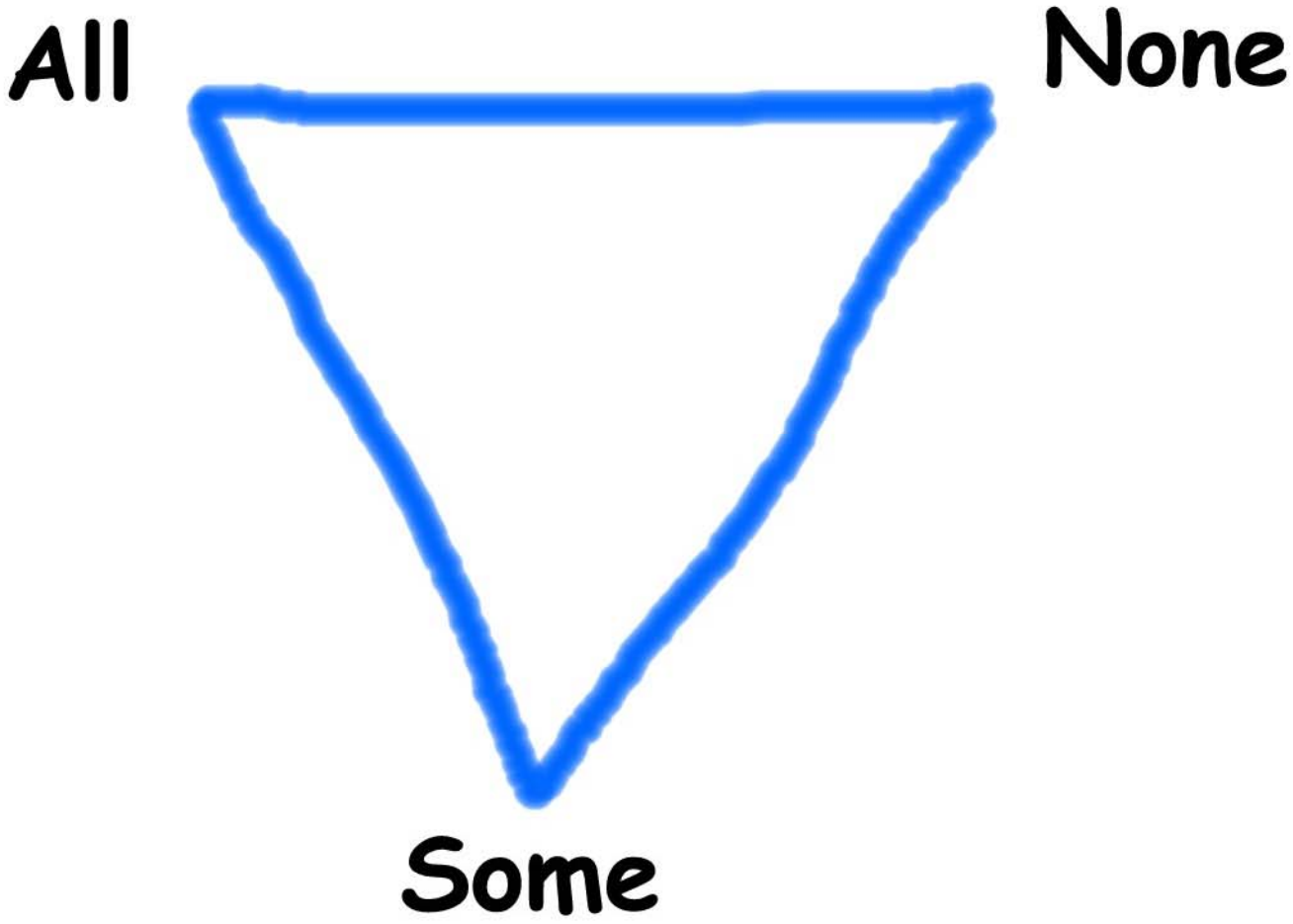
The 0-corner is nameless - it is purely negative

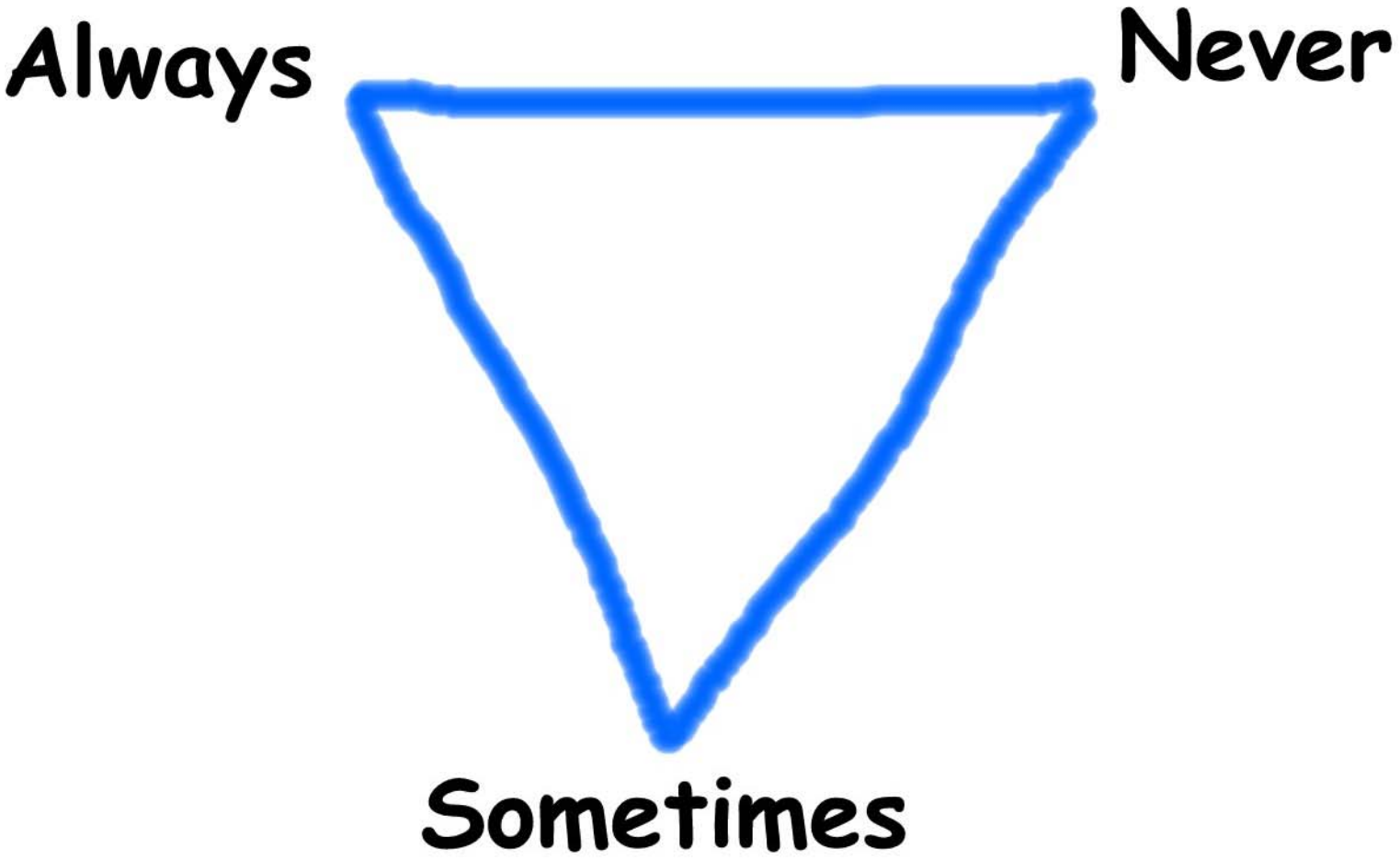
- Not all
- Not necessary
- Not obligatory
- Not always

Triangle of Opposition

Maybe we have to replace the square with a triangle

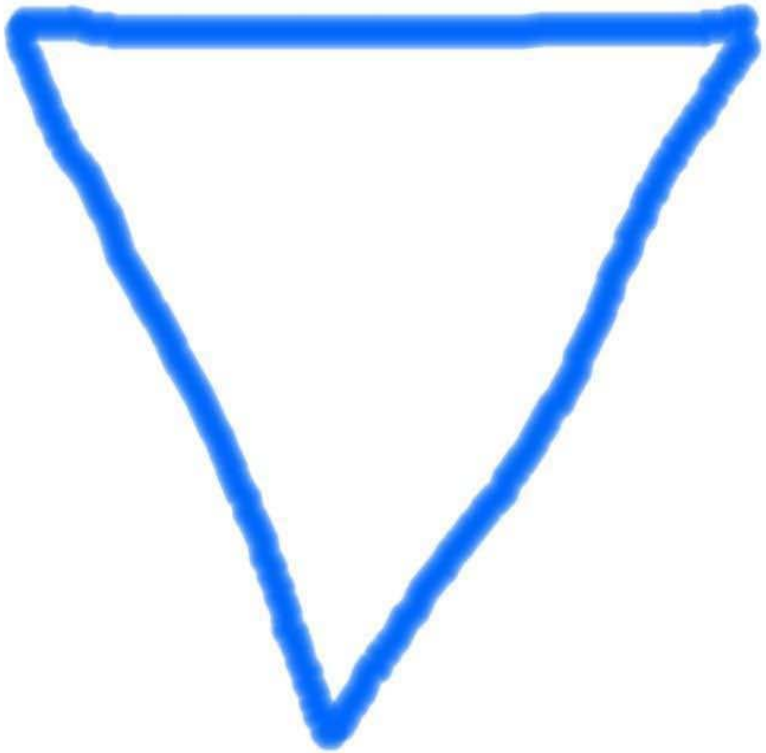
- Vasiliev (Russia 1890, Imaginary logic)
- Jespersen (Denmark, 1920, Linguist)
- Blanché (France, 1950, Logician)


All
None
Some


Always
Never
Sometimes

Everywhere

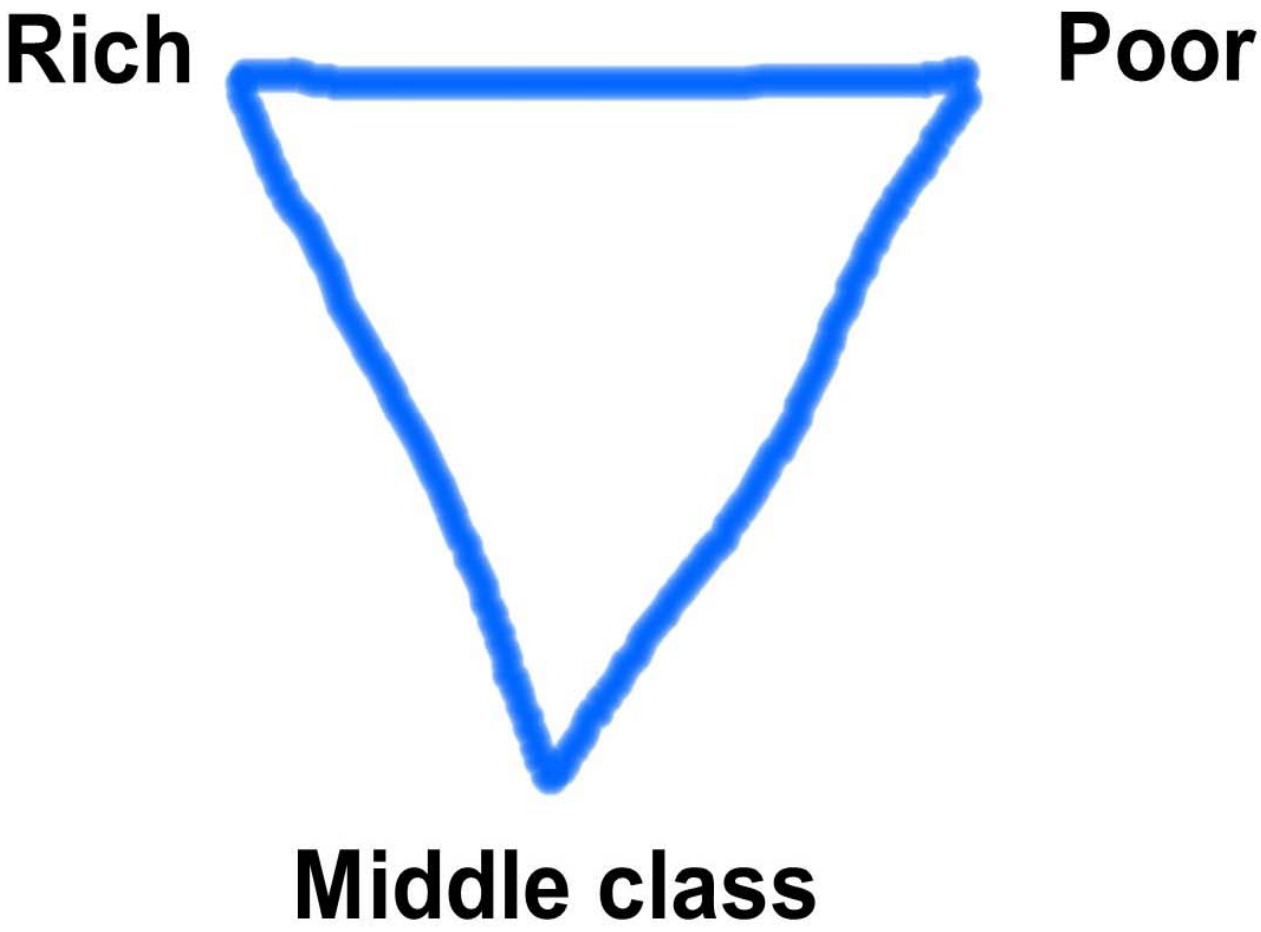
Nowhere



Somewhere

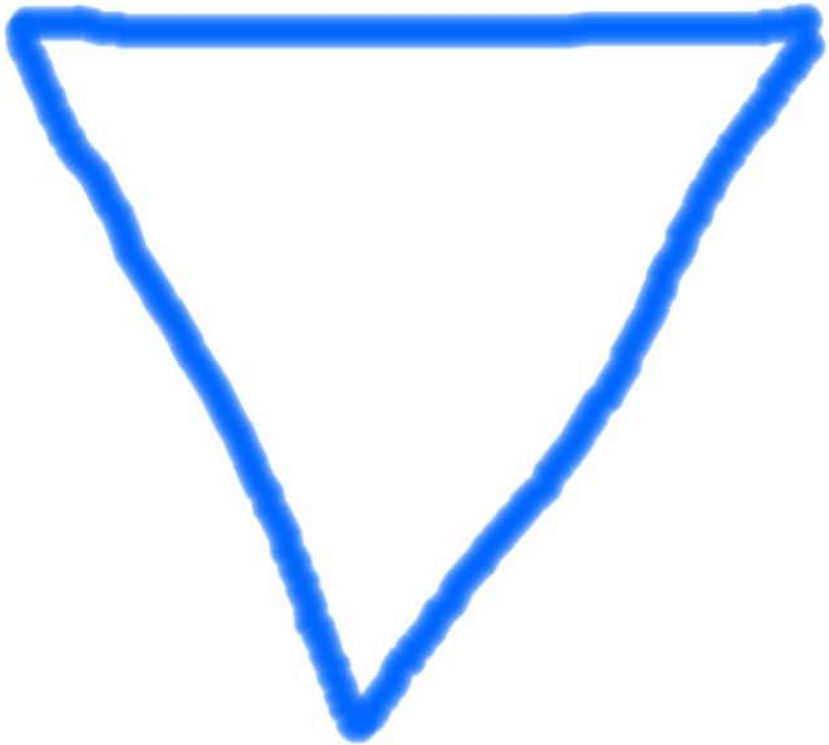
Two different perspectives

- Quantitative
- Qualitative


Rich
Poor
Middle class

Necessary

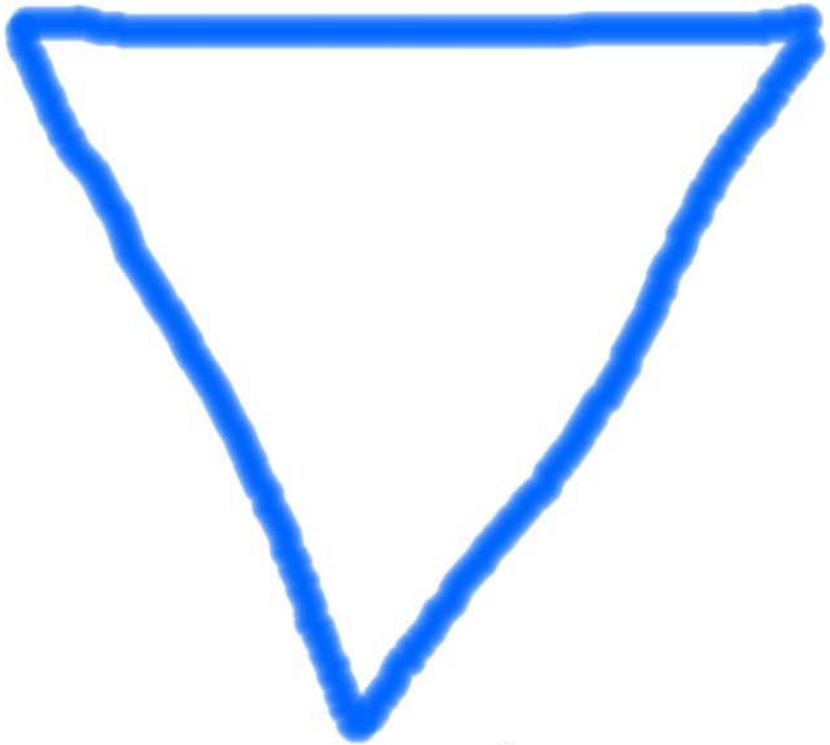
Impossible



Possible

The purse / the bottle is

Full



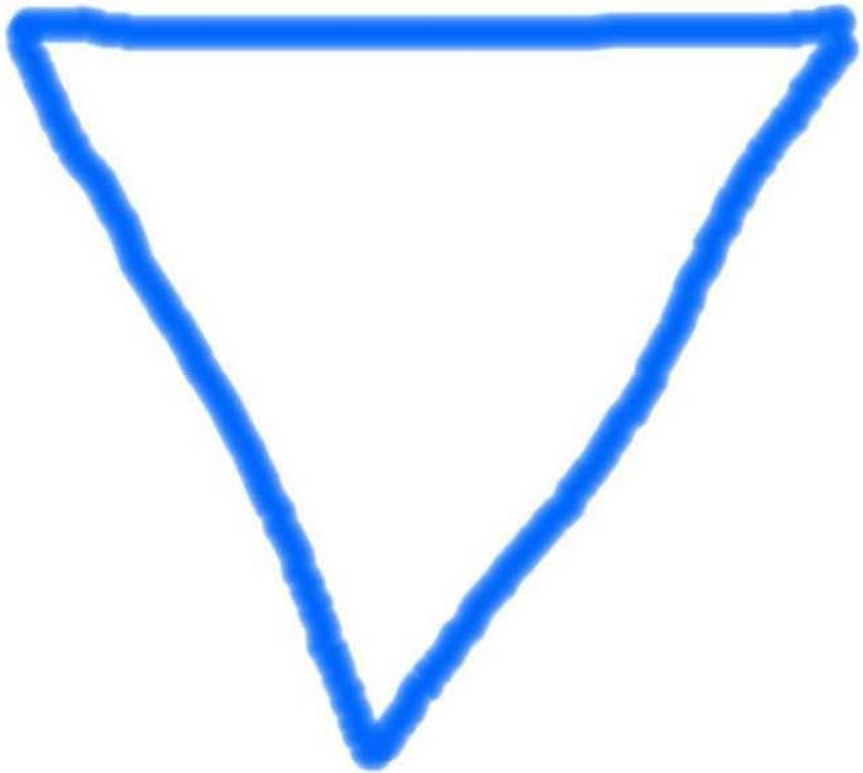
Empty

entamée

Open

Left

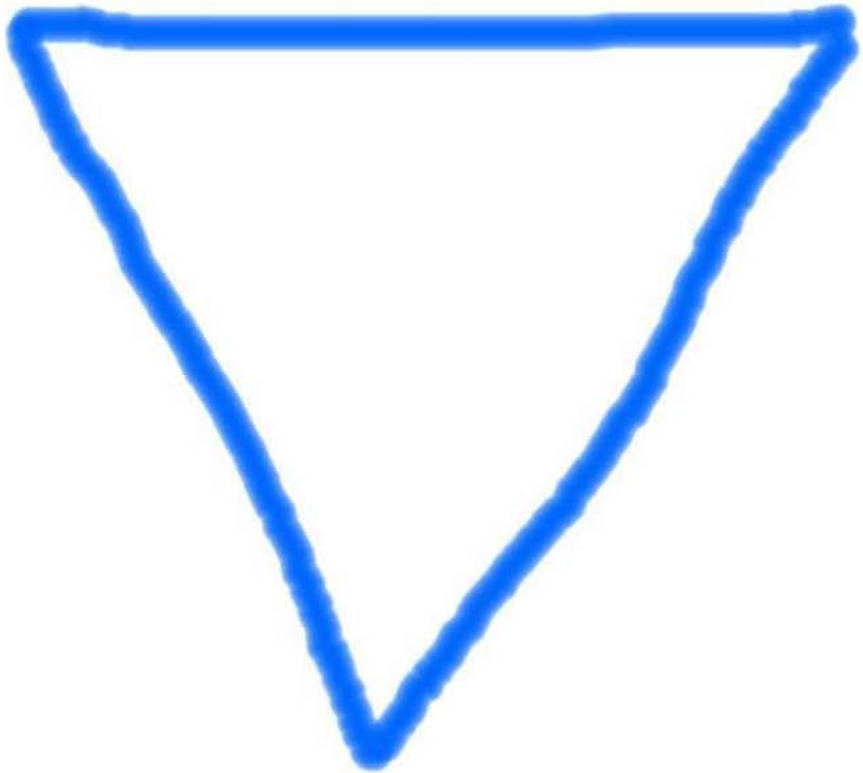
Right



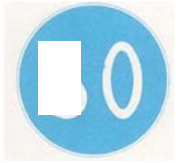
Center

The Triangle of Contrariety is better than the Square of Opposition

Obligatory Prohibited

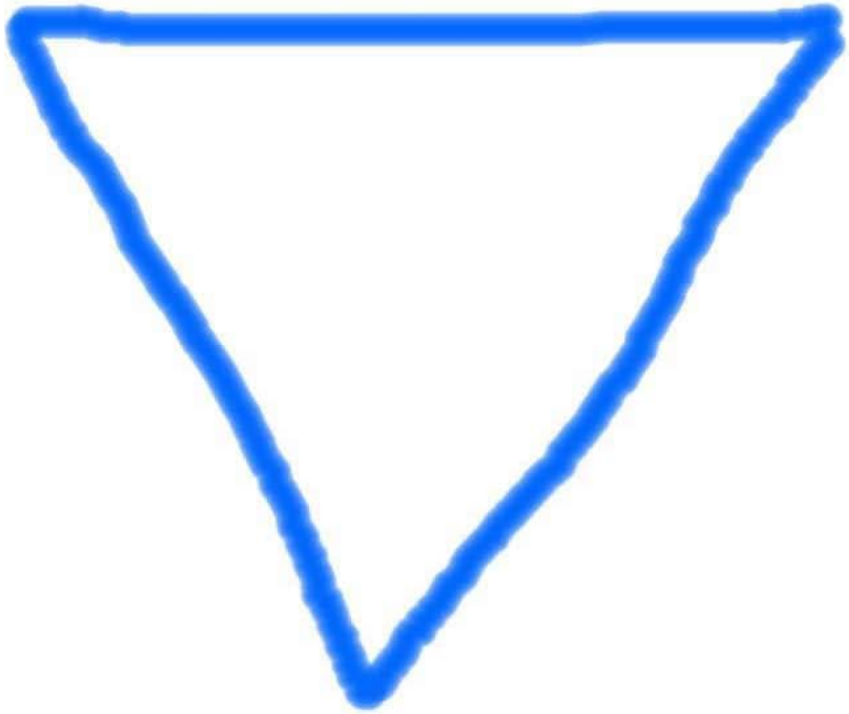


Allowed



Obligatory

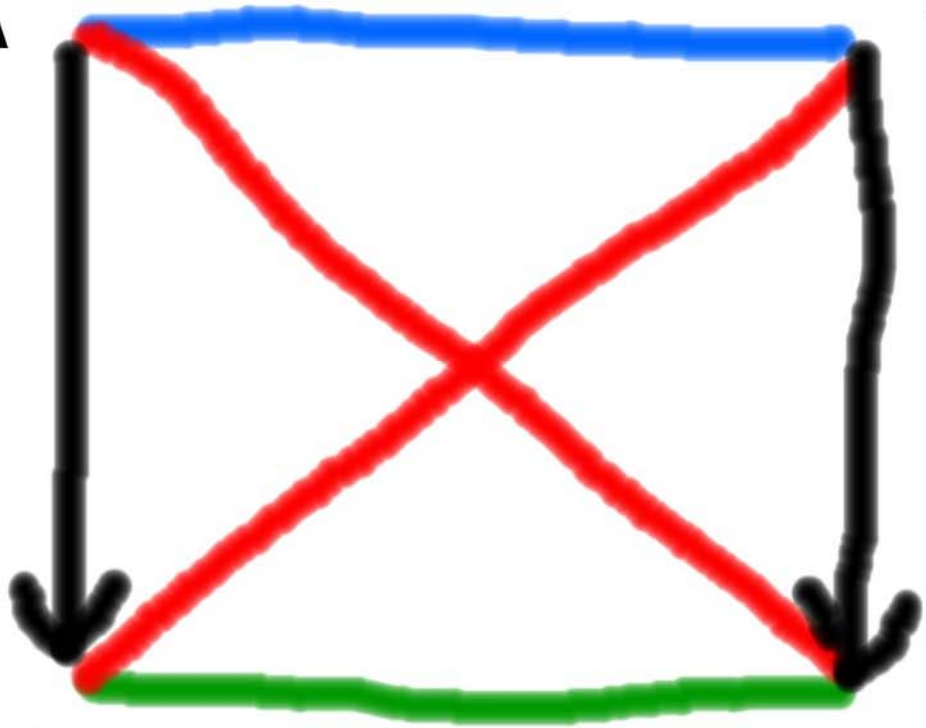
Prohibited



Allowed

Obligatory
A

Prohibited
E

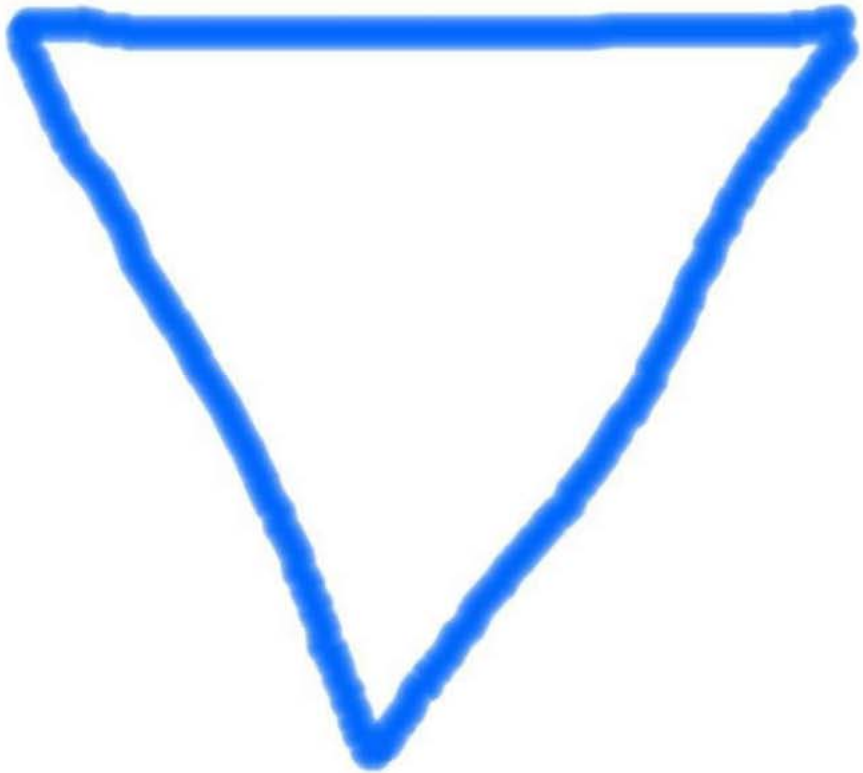


I
Allowed

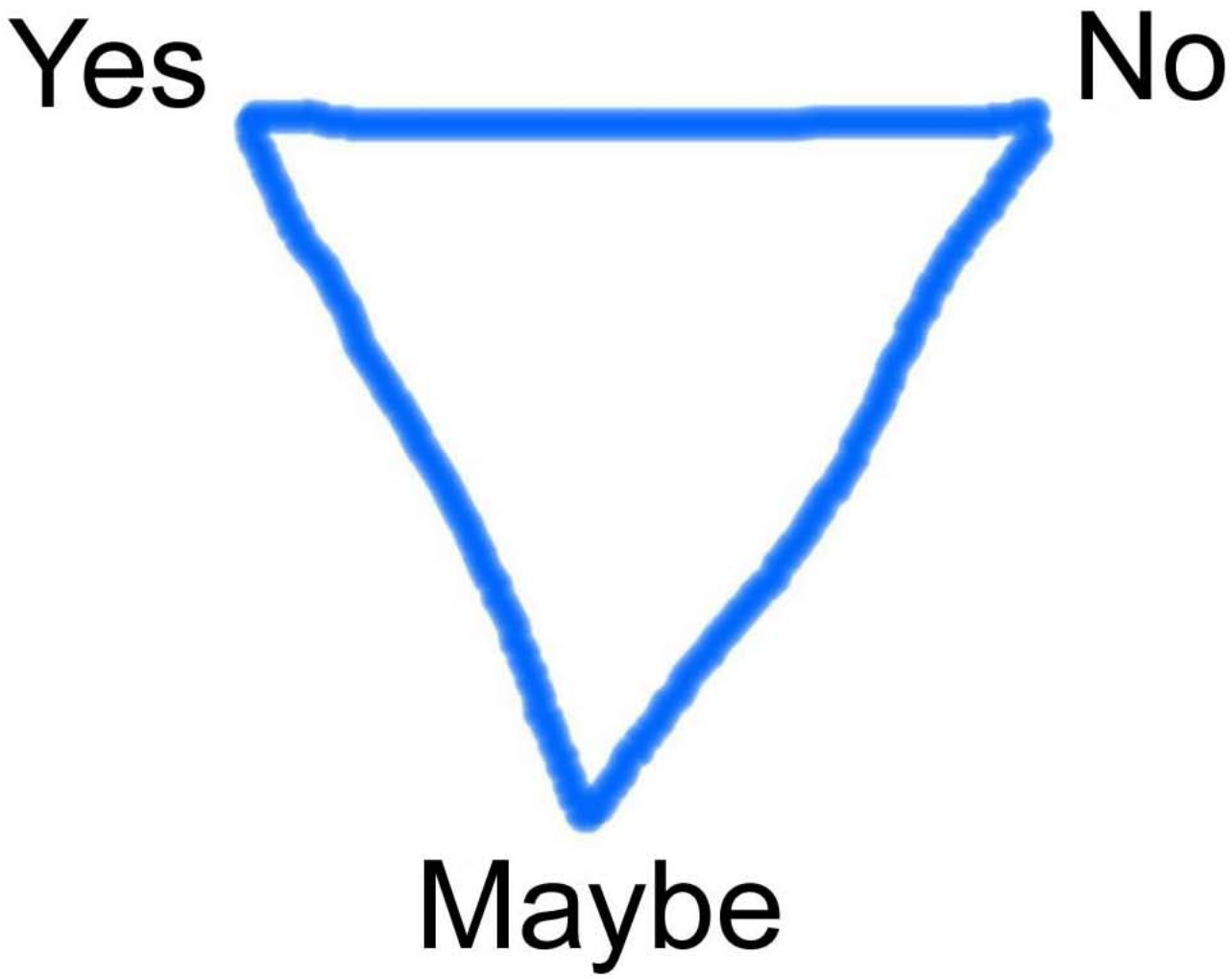
O
Not obrigatory

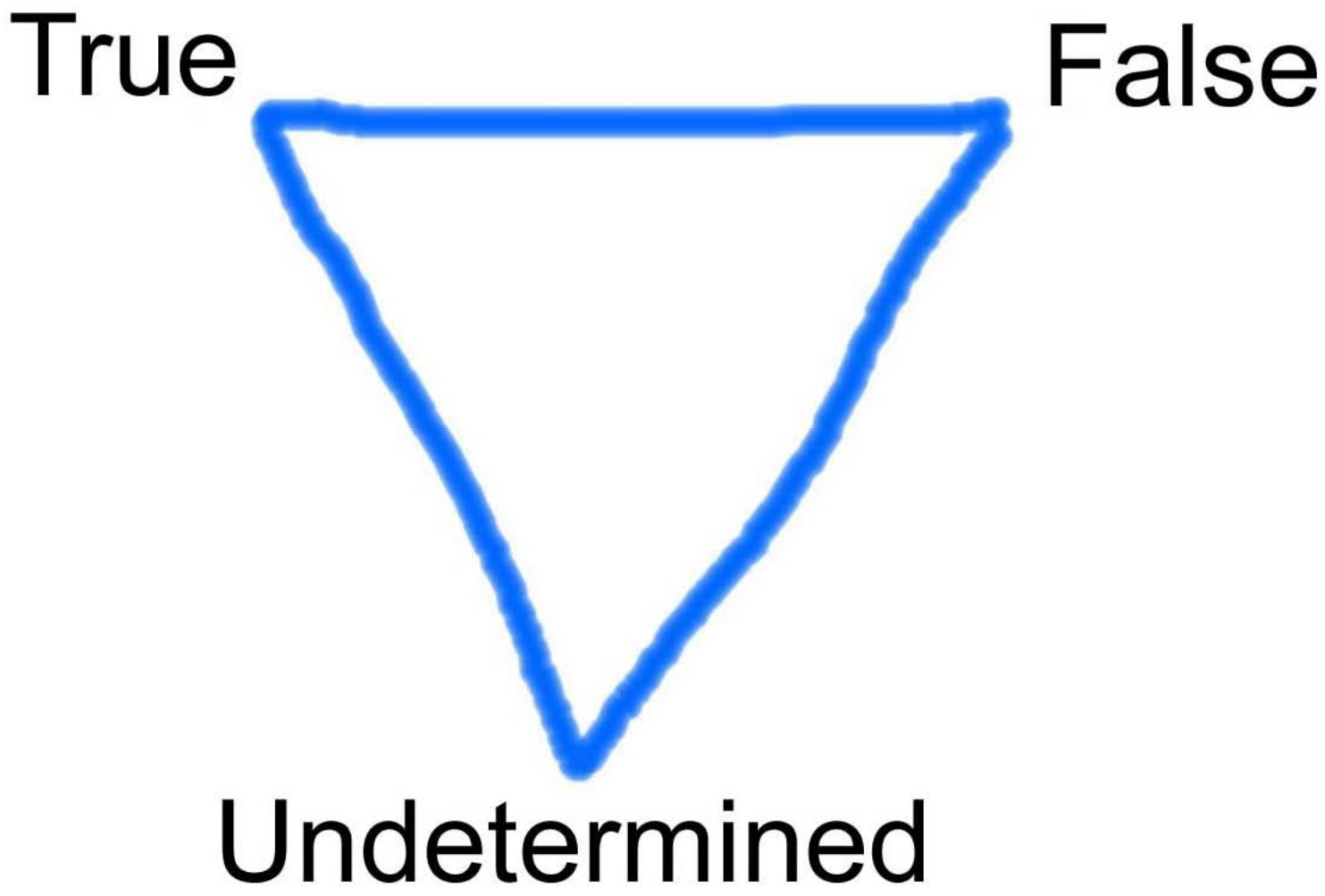
Go

Stop



Go or Stop


Yes
No
Maybe


True
False
Undetermined

Trichotomy

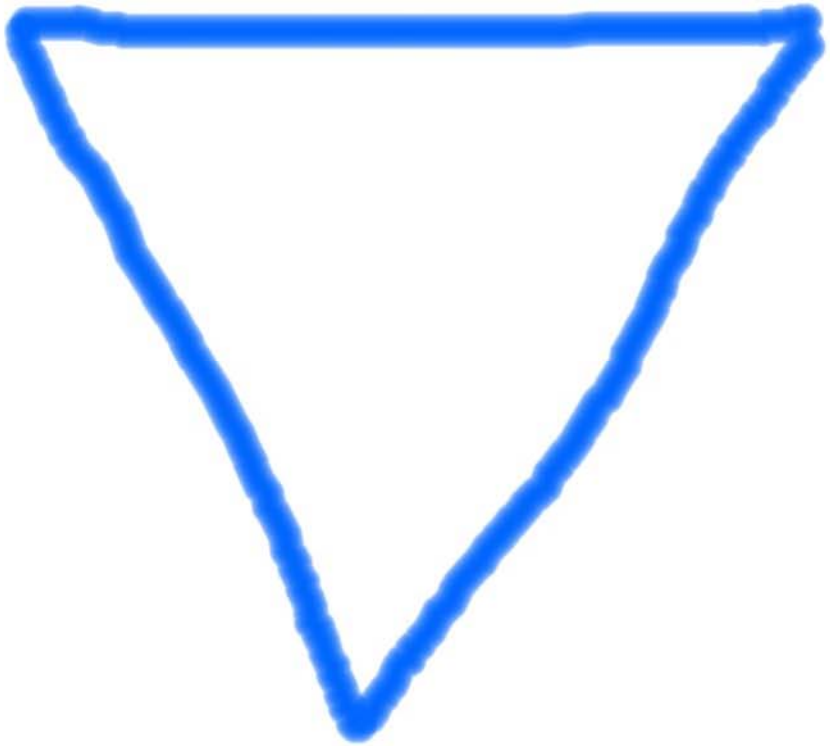
is better than

Dichotomy


Buy
Sell

Buy

Sell



Rent

Save Spend


Invest
BROOKLYN
BATTERY
TUNNEL
TRUCK
ROUTE
LOCAL


Spend


Save

Pythagoras Table of Opposites

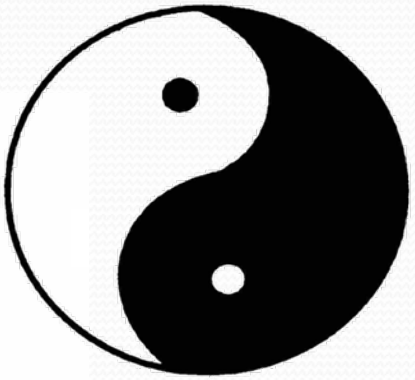
- Odd / Even
- Finite / Infinite
- Straight/Crooked
- Square / Oblong
- Right / Left
- One / Many
- In / Out
- Happy / Sad
- Close / Open
- Rest / Motion
- Good / Evil
- Light / Darkness

More Opposites

- Male / Female
- Beautiful / Ugly
- Rich / Poor
- Clever / Stupid
- Religious / Atheist
- Discrete / Continuous
- White / Black
- Cool / Hot
- Big / Small
- Strong / Weak
- Life / Death
- Being / Nothing

Qualitative dichotomy is limited

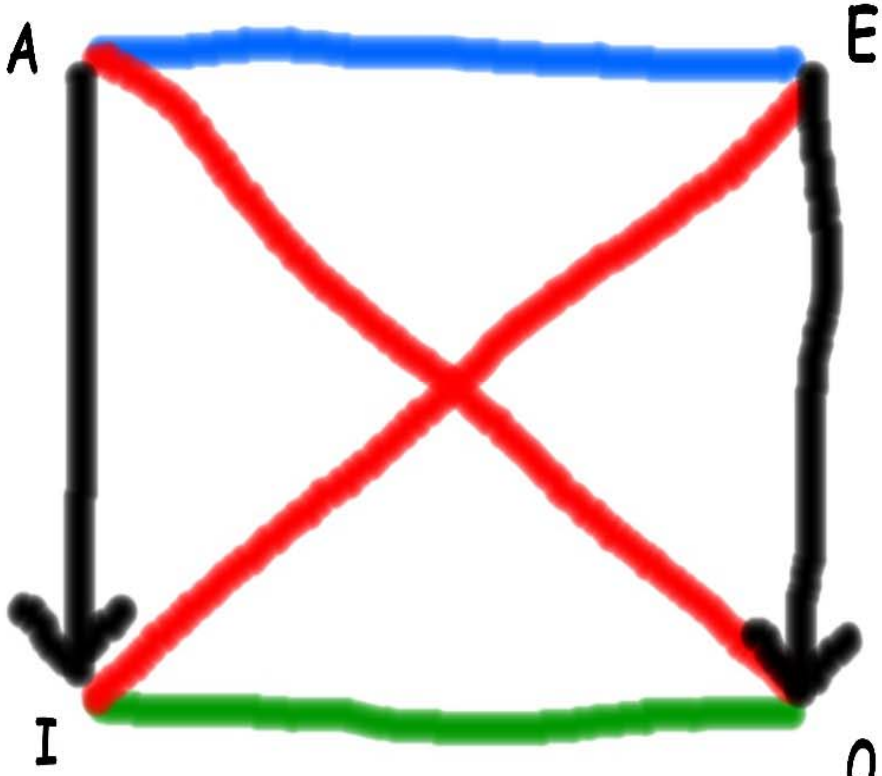
Not everything is black and/or white



Life is more colorful

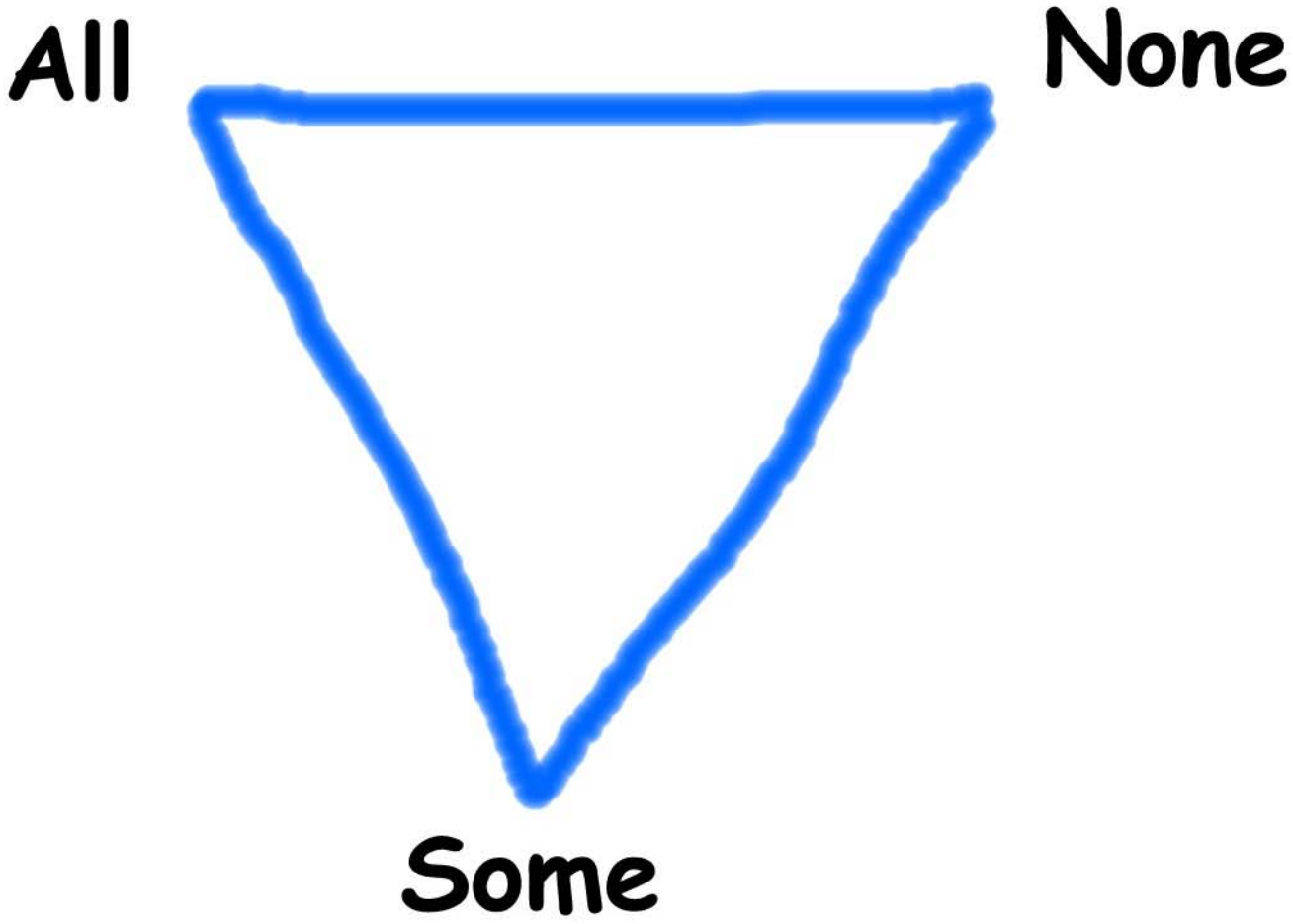
All men are white

No man is white



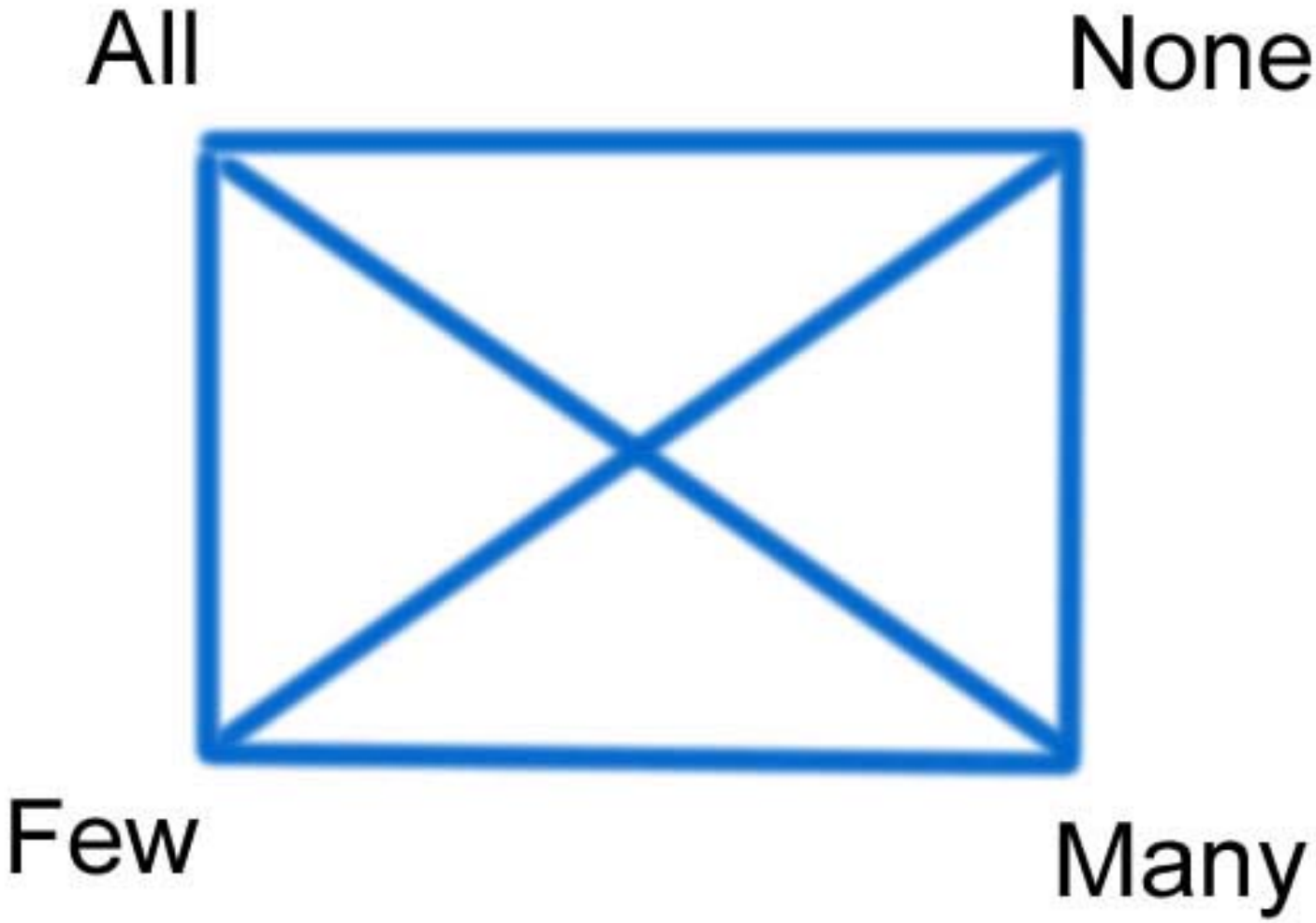
Some men are white

Not all men are white


All
None
Some

Trichotomy is better than dichotomy why not going to polytomy?

Nothing easier than generalization

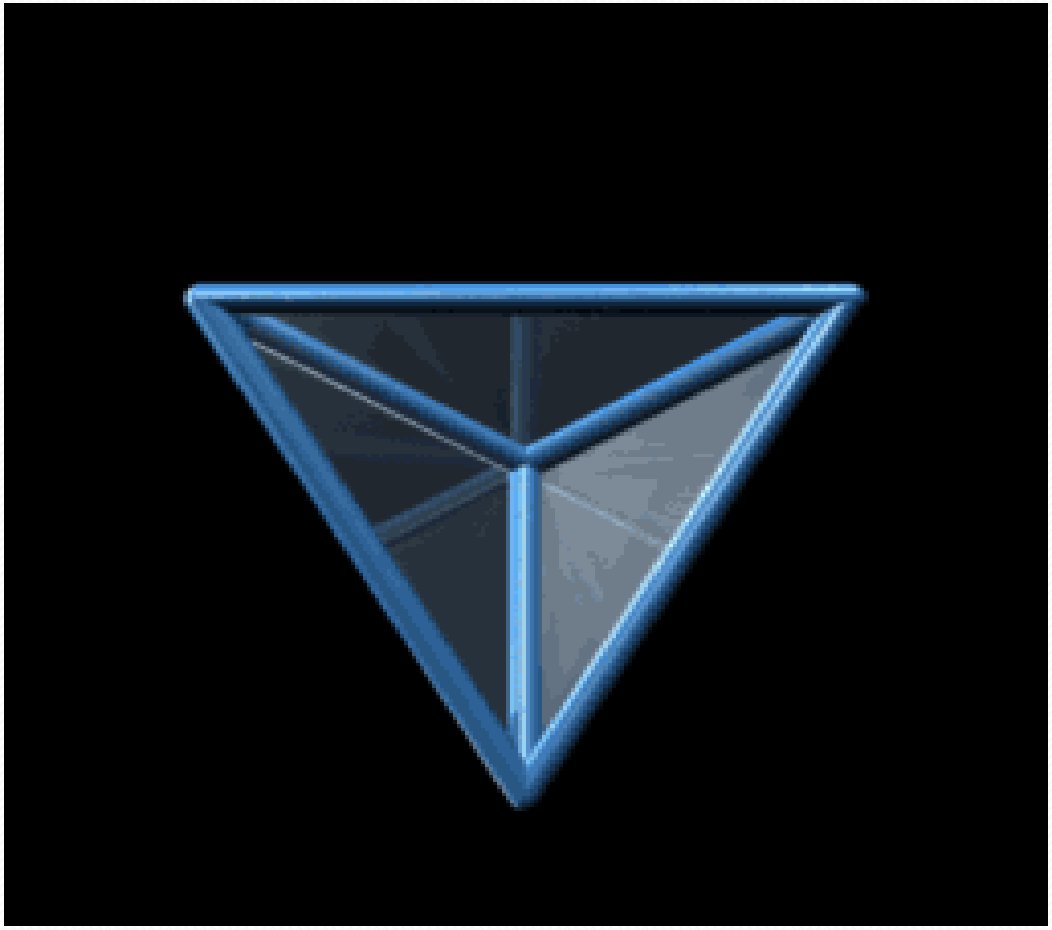

All
None
Few
Many

Yes

No

Neither Yes nor No

Yes and No



Dichotomy, Trichotomy, Polytomy

- Kant: Only dichotomy is *a priori*

  Polytomy is *a posteriori*/empirical

- Blanché: Trichotomy is *a priori*

- Are quatritomy / polytomy *a priori*?

The Four Elements

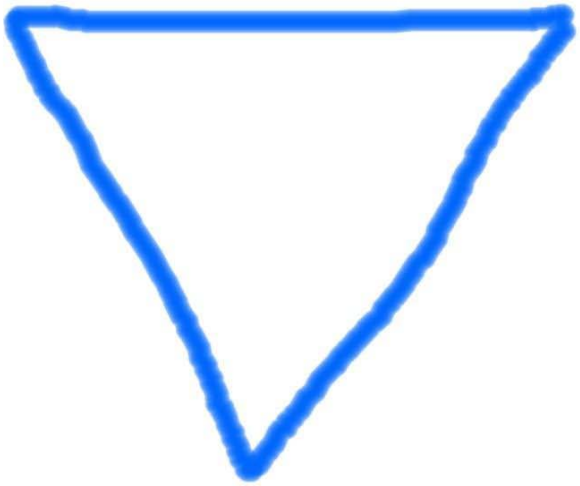

Spirit
Air
Water
Earth
Fire

- The square does not work properly
- Dichotomy is too simple
- Polytomy is empirical

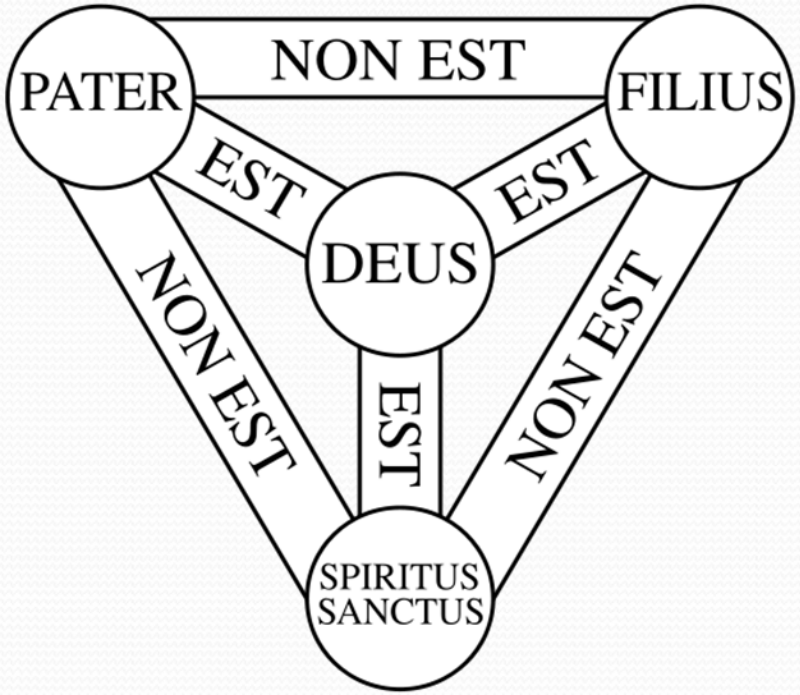
- Nothing better than a triangle ?

Thought is triangular

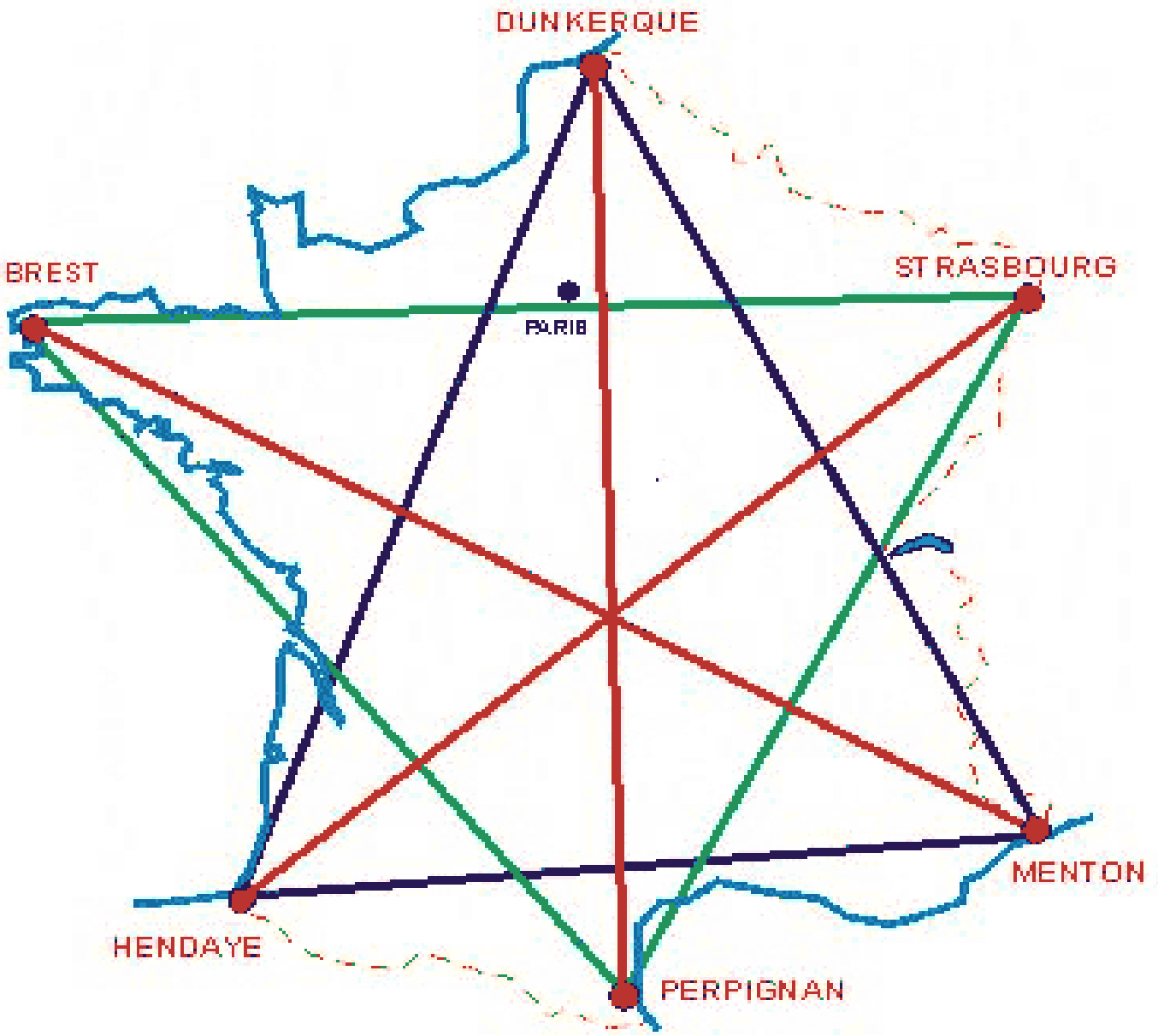
Reality is triangular



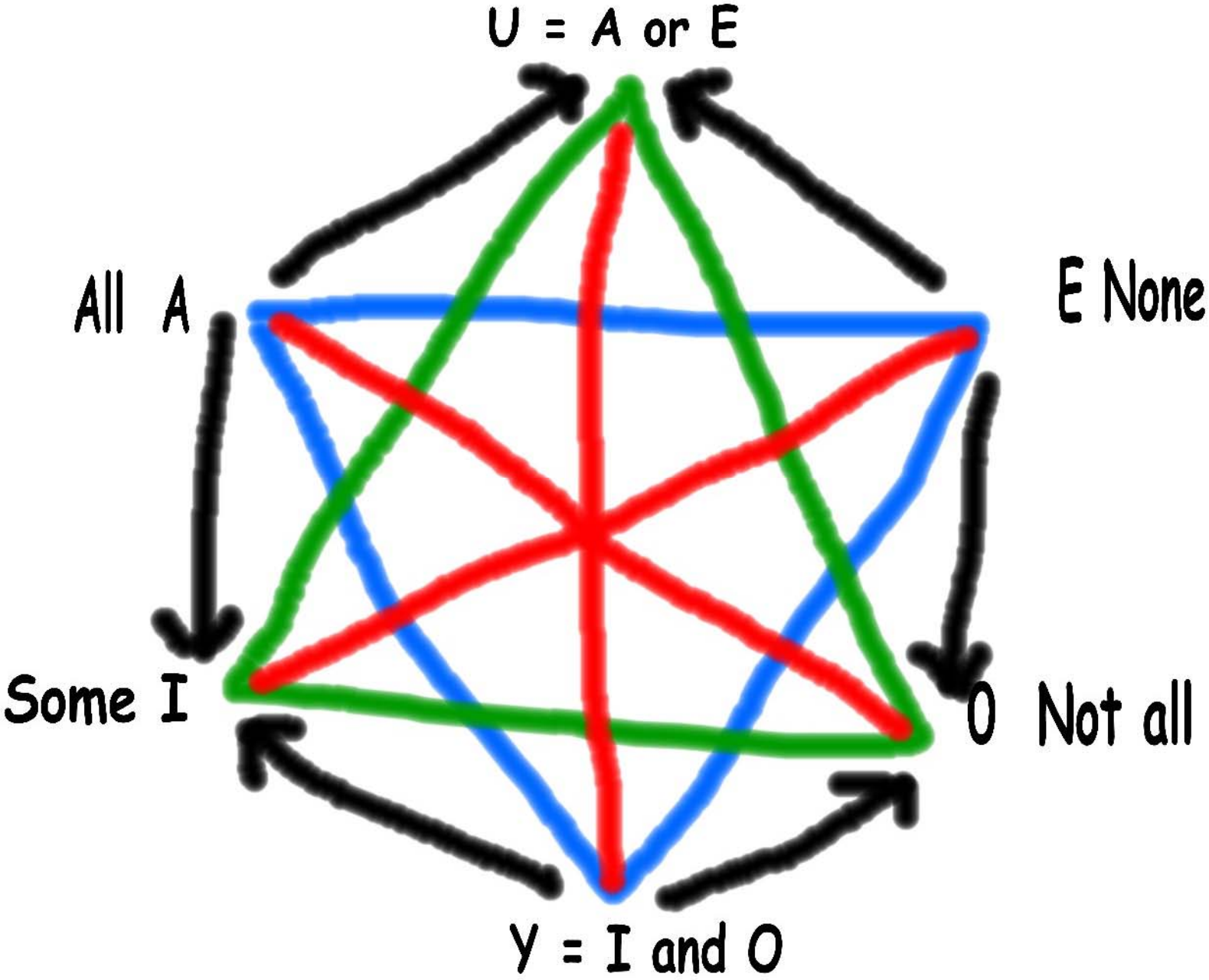
God is triangular

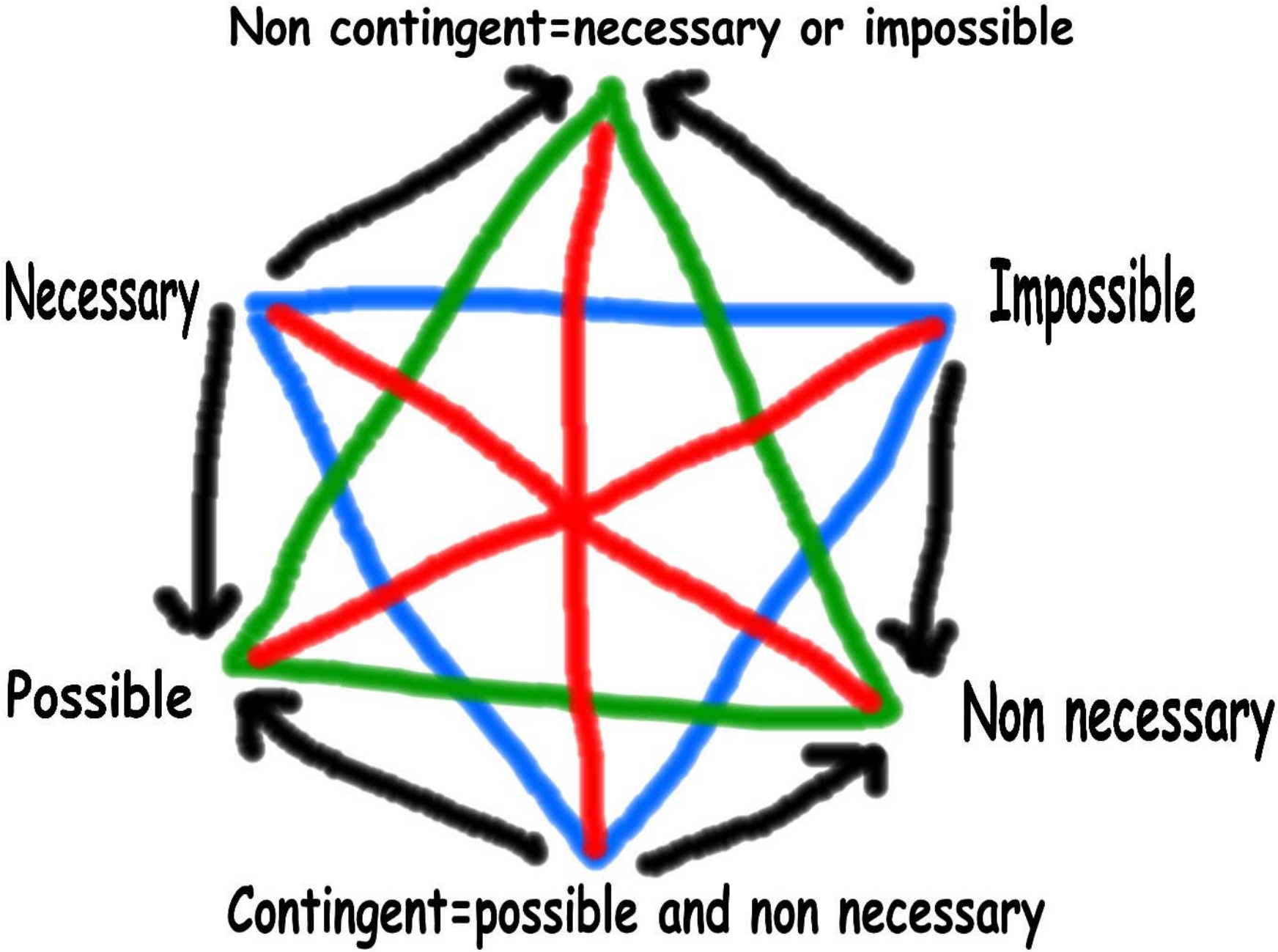


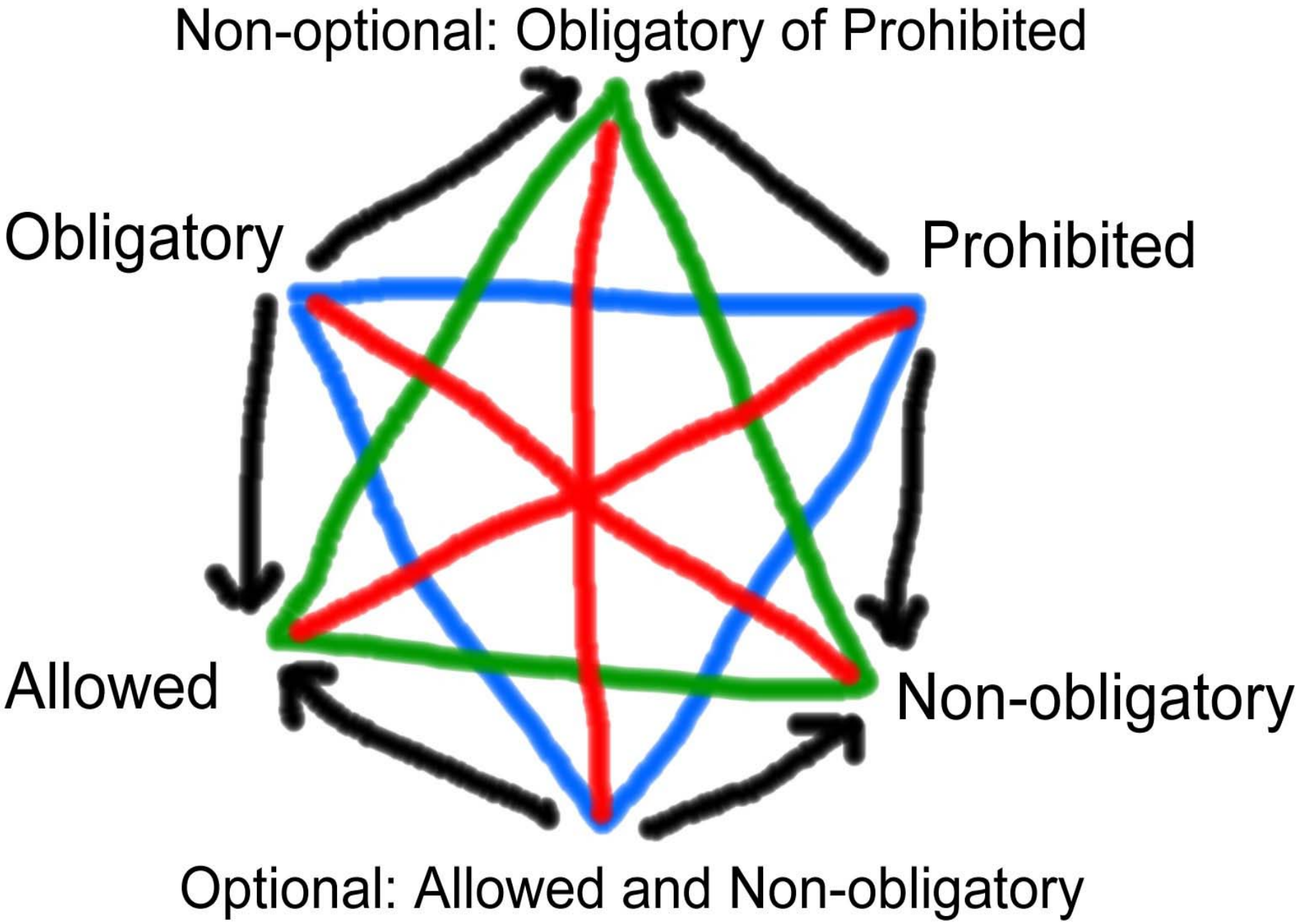
Everything is triangular?


DUNKERQUE
BREST
STRASBOURG
PARIS
MENTON
HENDAYE
PERPIGNAN

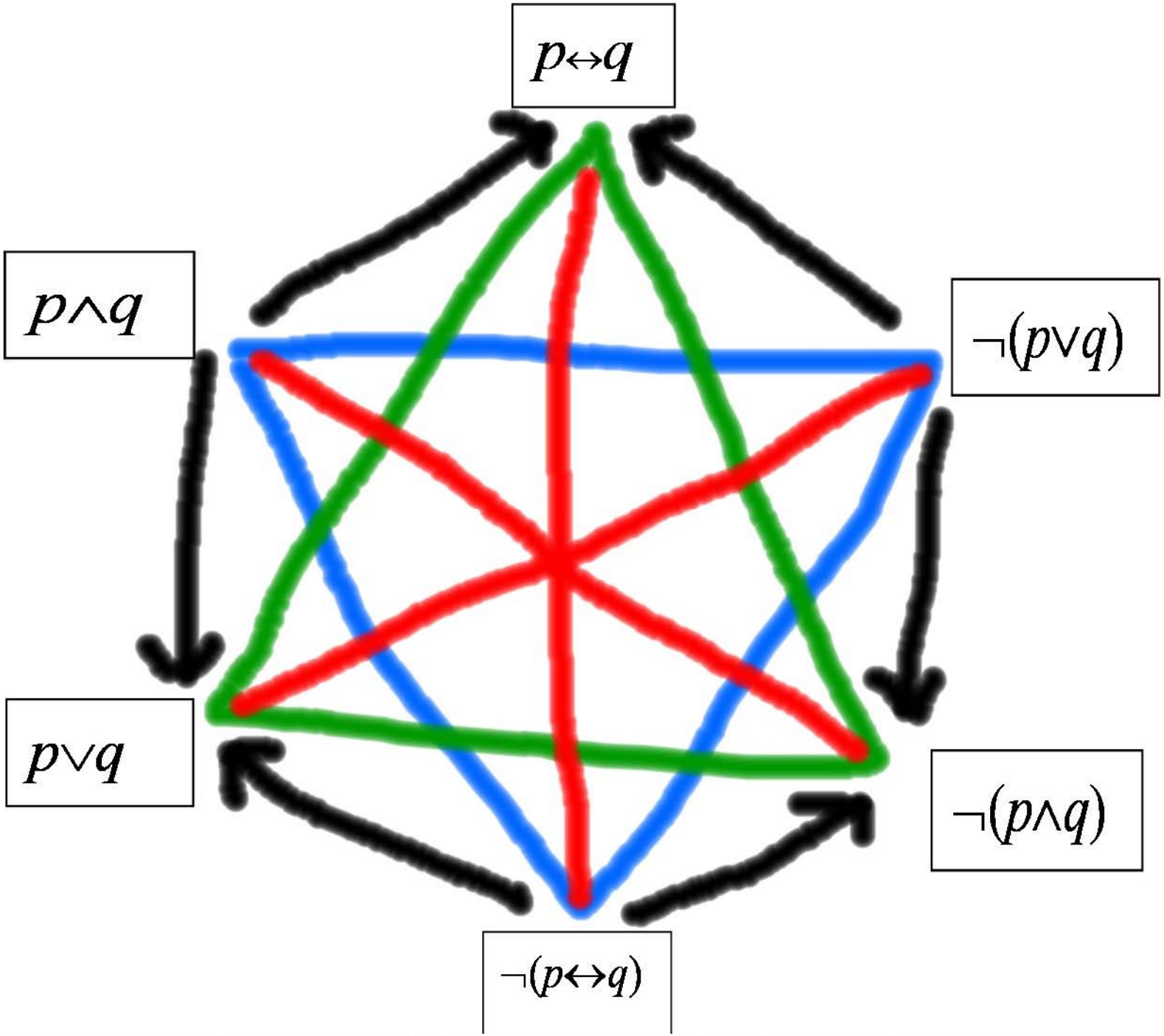
Hexagon of Opposition

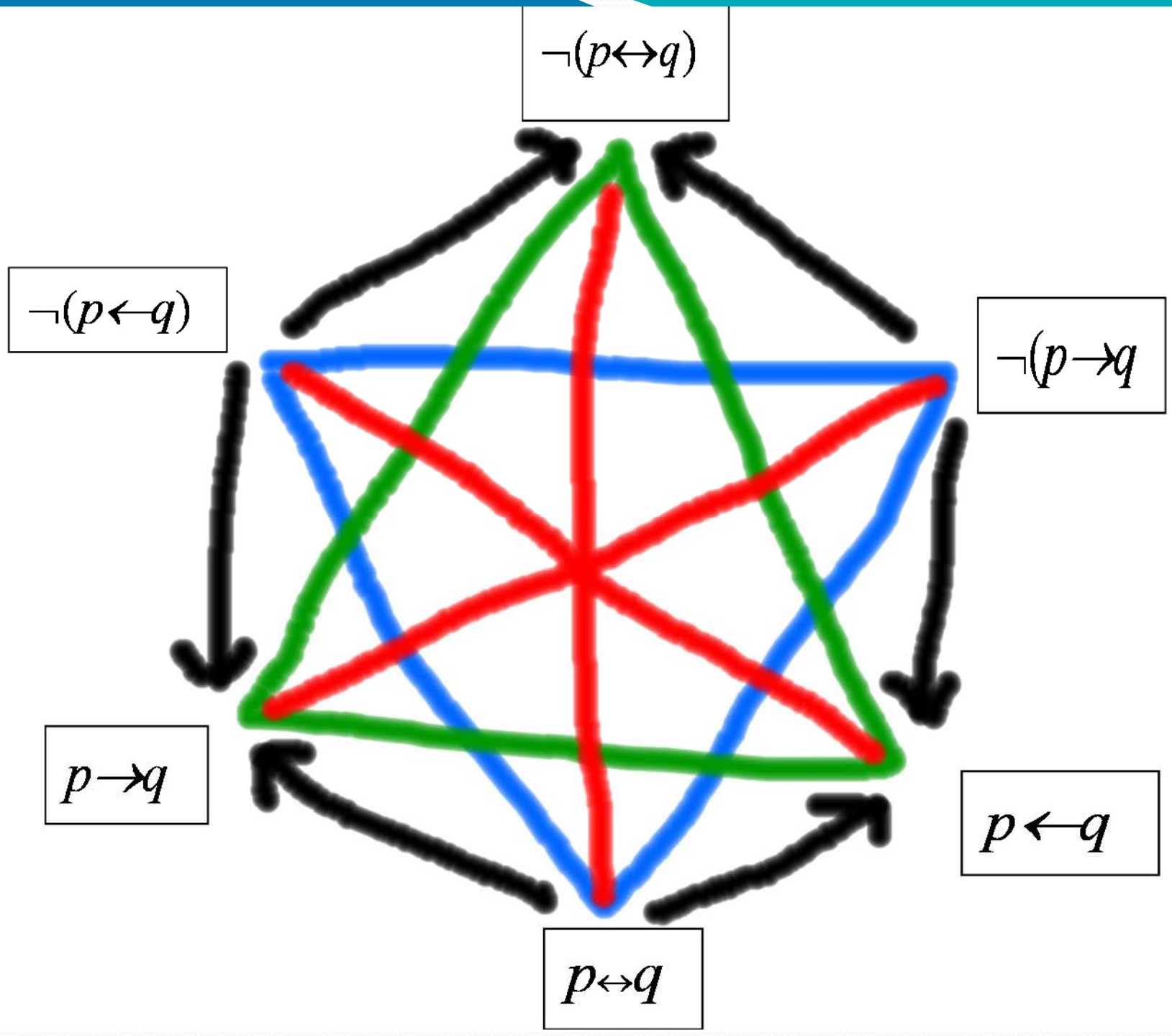

U = A or E
All A
E None
Some I
O Not all
Y = I and O

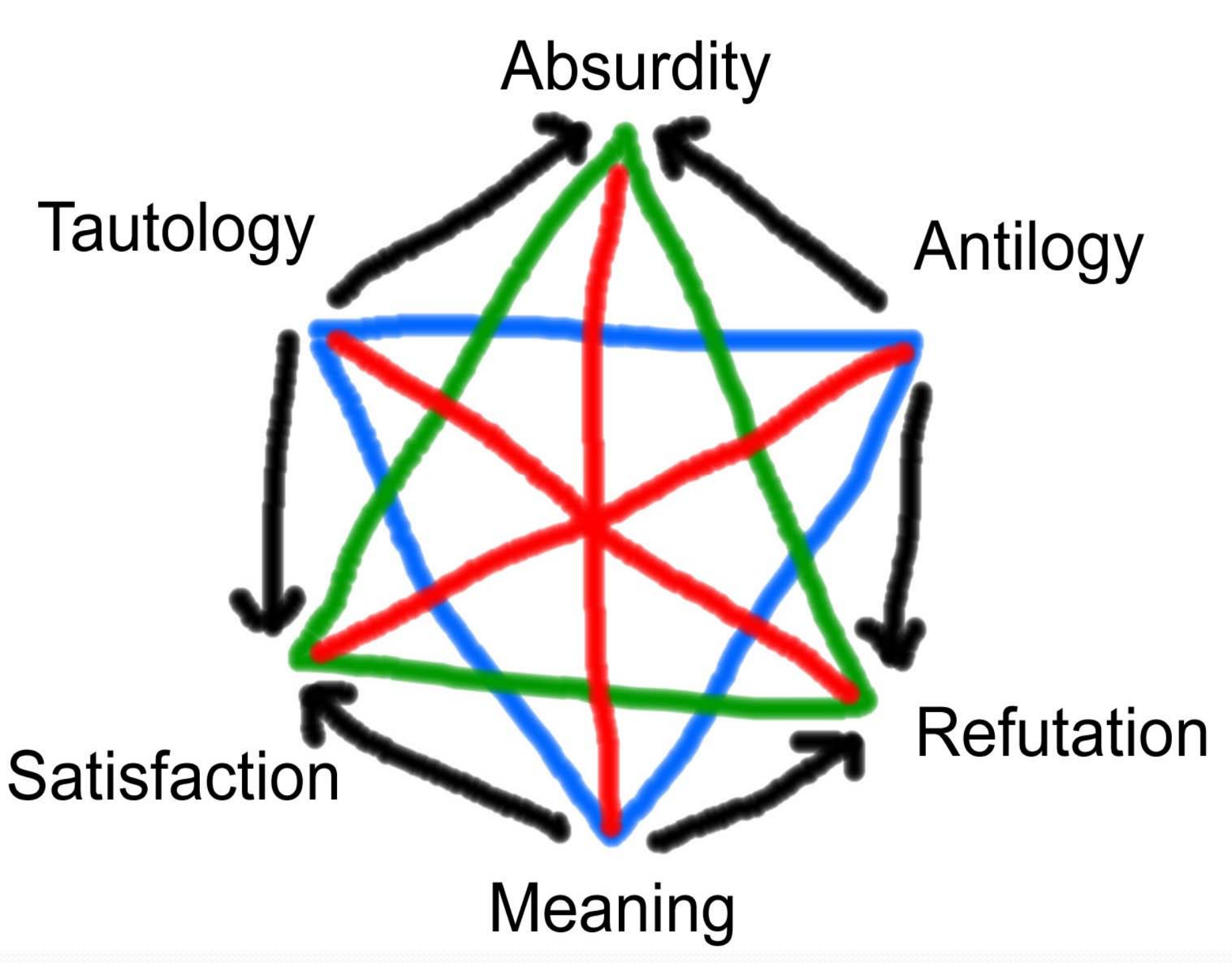

Non contingent=necessary or impossible
Necessary
Impossible
Possible
Non necessary
Contingent=possible and non necessary

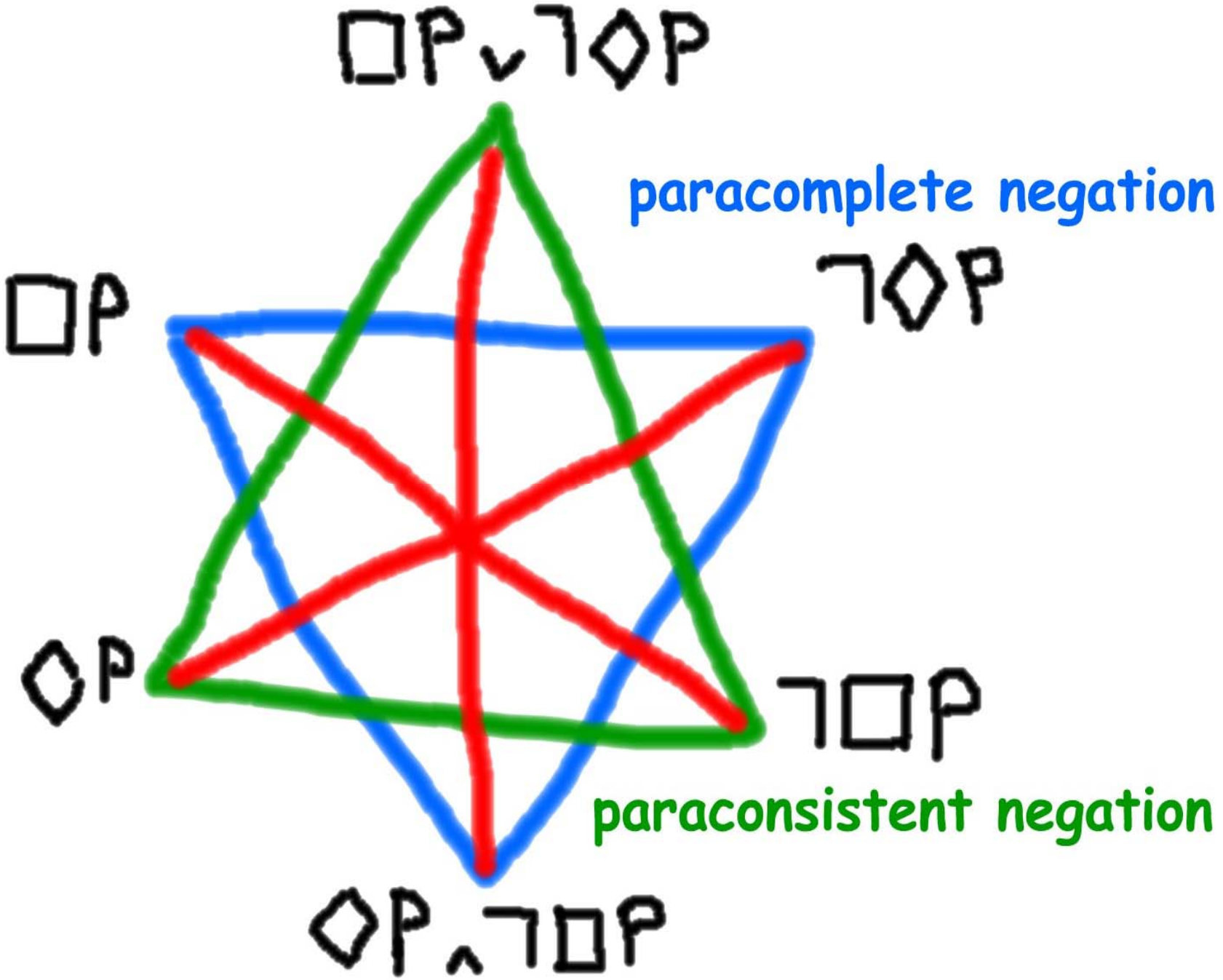

Non-optional: Obligatory of Prohibited
Obligatory
Prohibited
Allowed
Non-obligatory
Optional: Allowed and Non-obligatory

The Hexagon is Logical and MetaLogical


$p \leftrightarrow q$
$p \wedge q$
$\neg(p \vee q)$
$p \vee q$
$\neg(p \wedge q)$
$\neg(p \leftrightarrow q)$

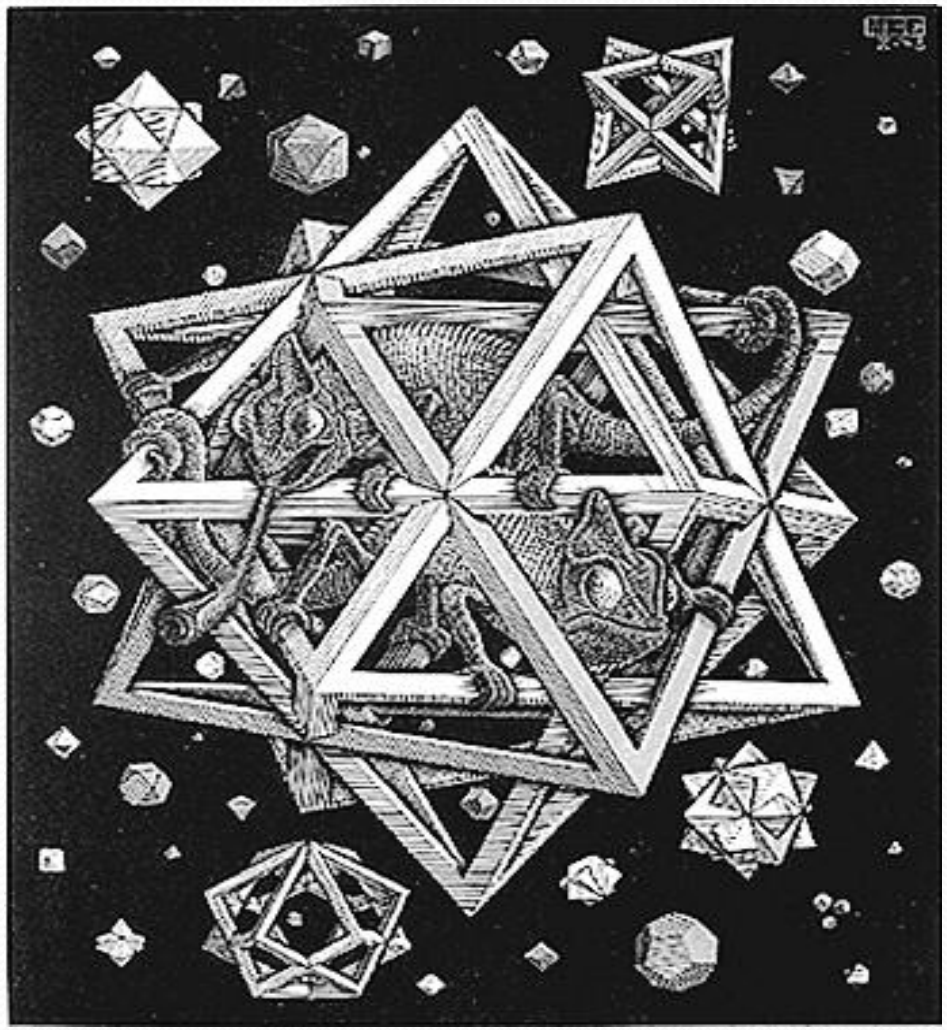

$\neg(p \leftrightarrow q)$
$\neg(p \leftarrow q)$
$\neg(p \rightarrow q$
$p \rightarrow q$
$p \leftarrow q$
$p \leftrightarrow q$


Absurdity
Tautology
Antilogy
Satisfaction
Refutation
Meaning


□P∨¬◇P
paracomplete negation
□P
¬◇P
◇P
¬□P
paraconsistent negation
◇P∧¬□P


□P∨7□P
□P
7□P
P
7P
□P
7□□P
□P∧7□□P

Stellar Dodecahedron



Two ways to produce a square / a hexagon

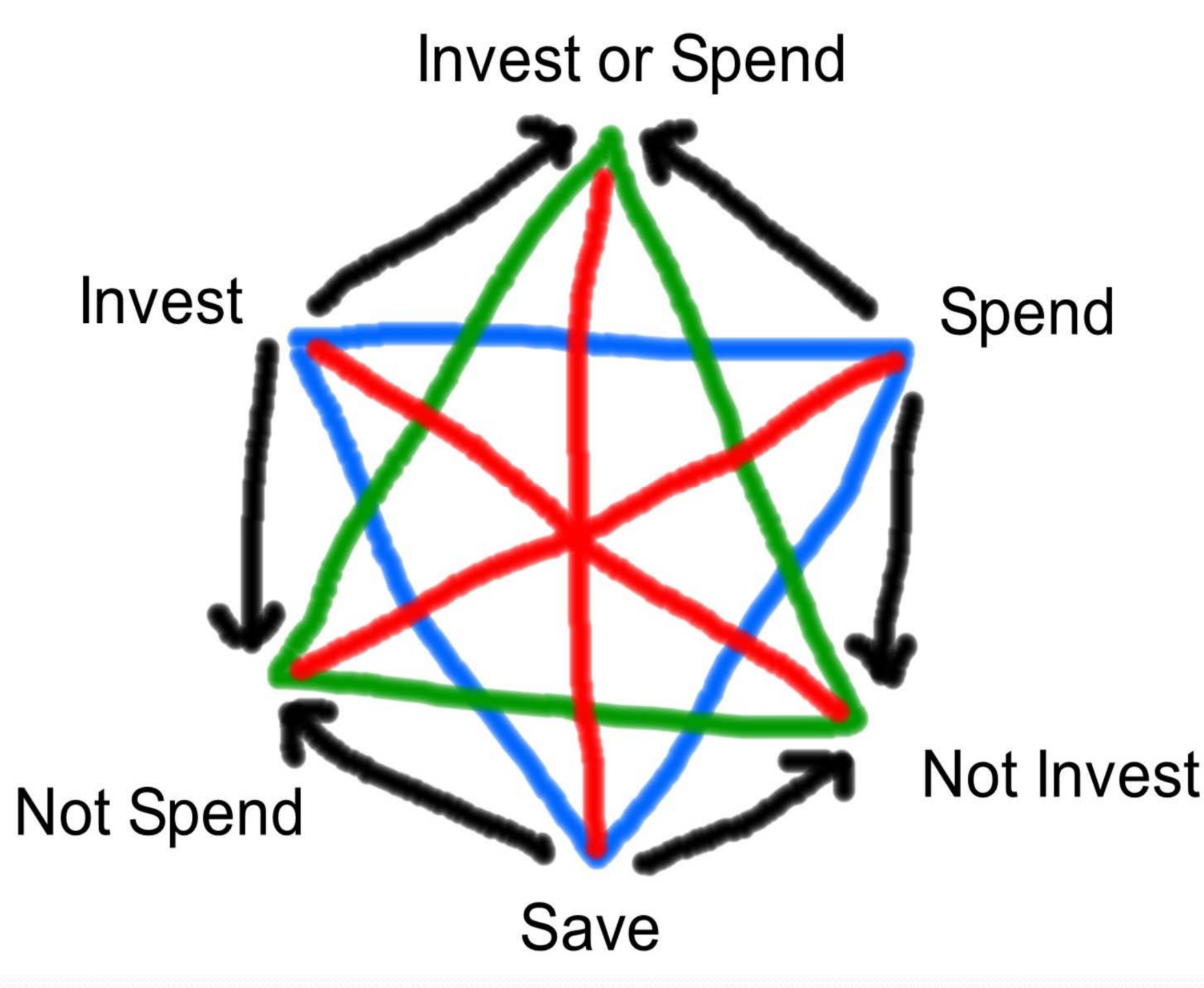
- Starting with a triangle
- Starting with an implication

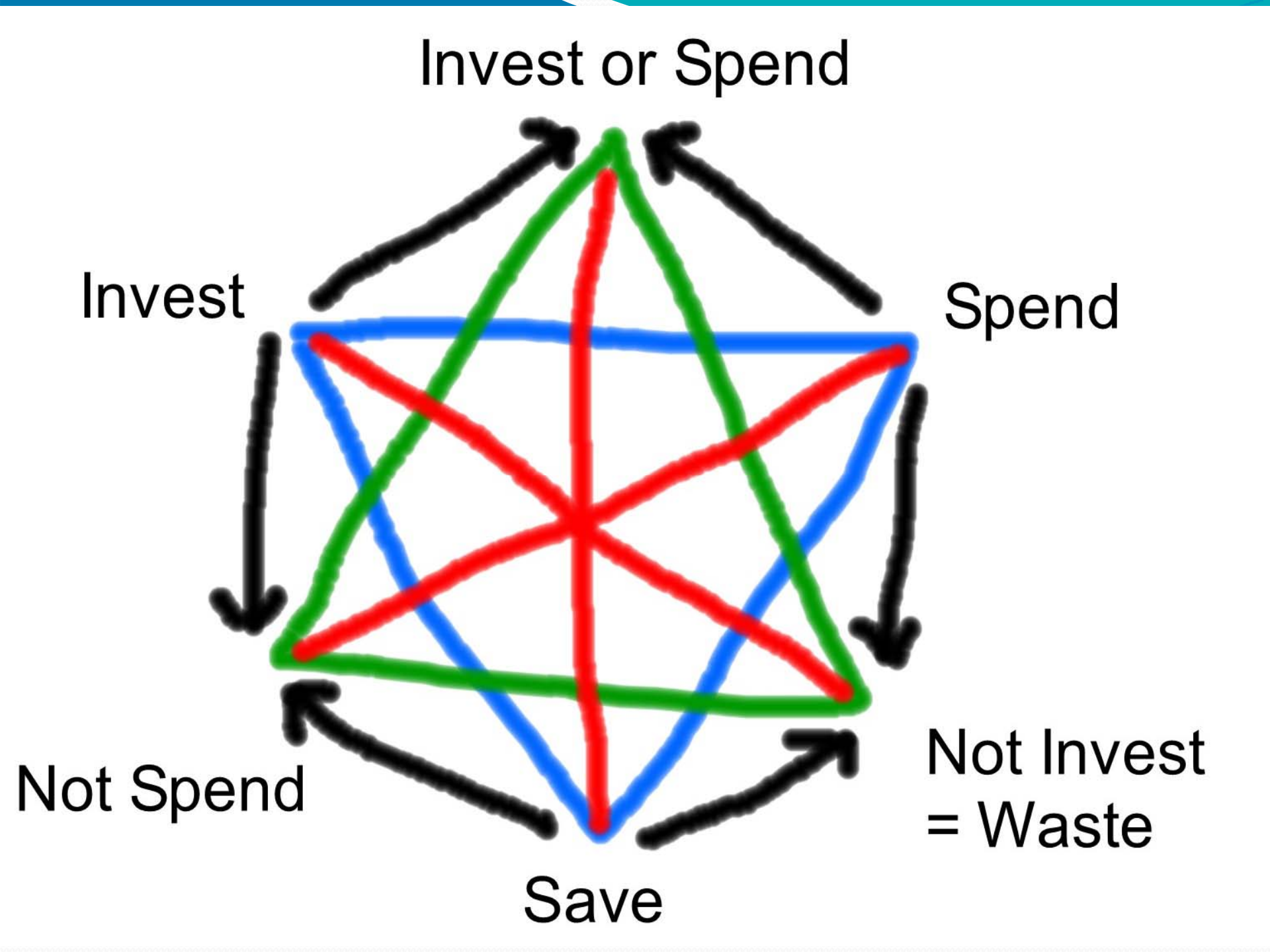
Hexagons from Triangles


Invest
BROOKLYN
BATTERY
TUNNEL
TRUCK
ROUTE
LOCAL


Spend


Save


Invest or Spend
Invest
Spend
Not Spend
Not Invest
Save

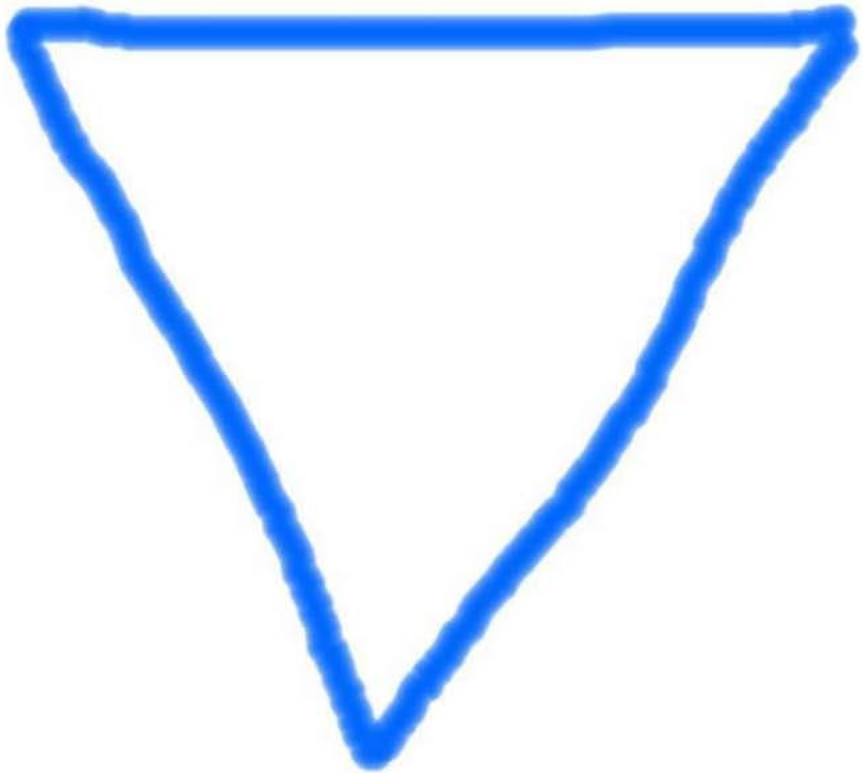

Invest or Spend
Invest
Spend
Not Spend
Not Invest
= Waste
Save

Hexagons from Implications
Discovering triangles


discrete
continuous

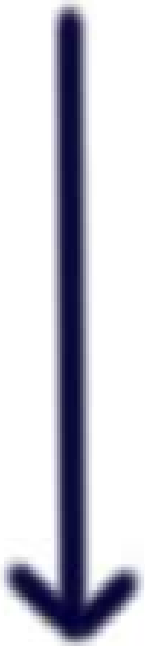
Continuous

Discrete

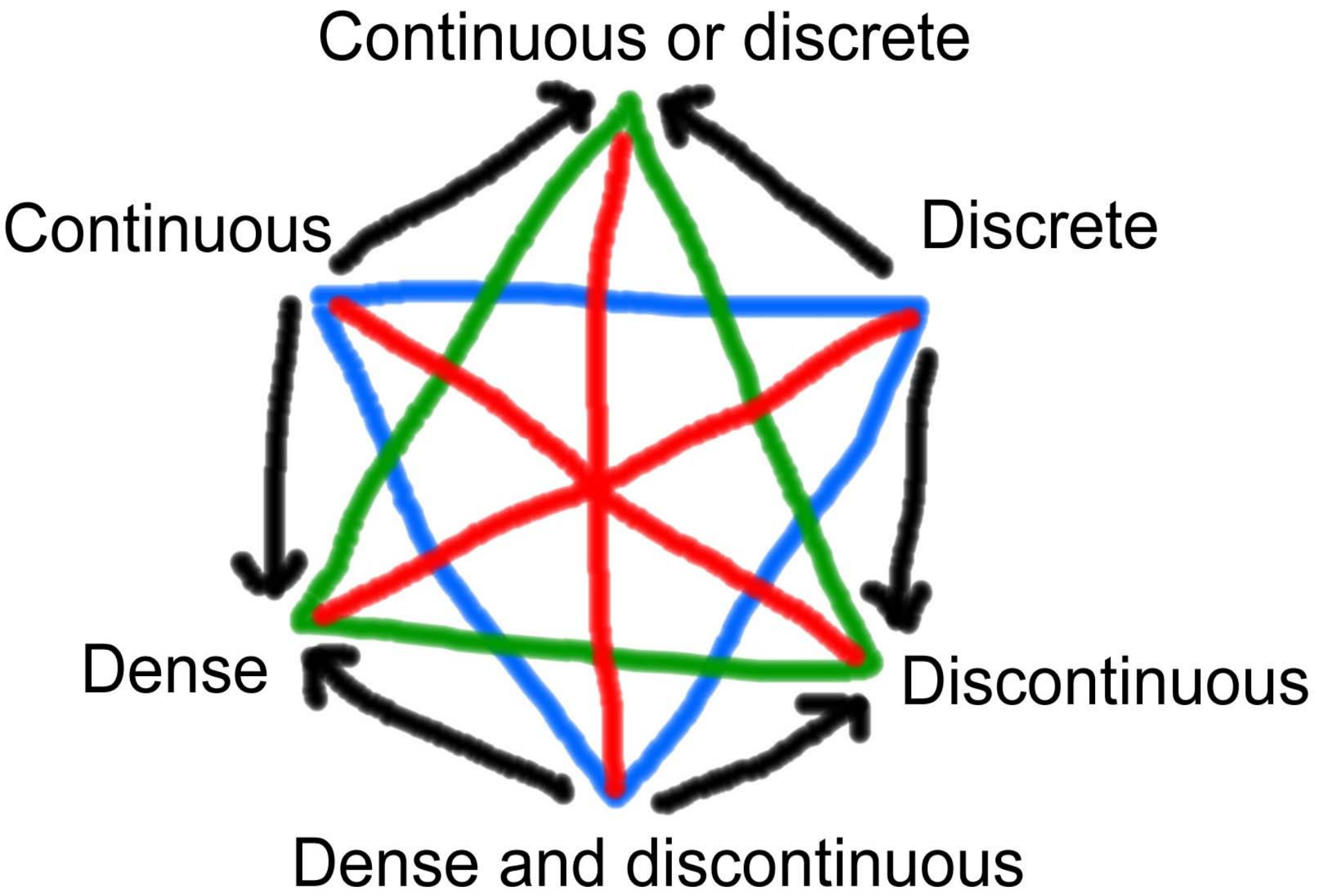


?

continuous



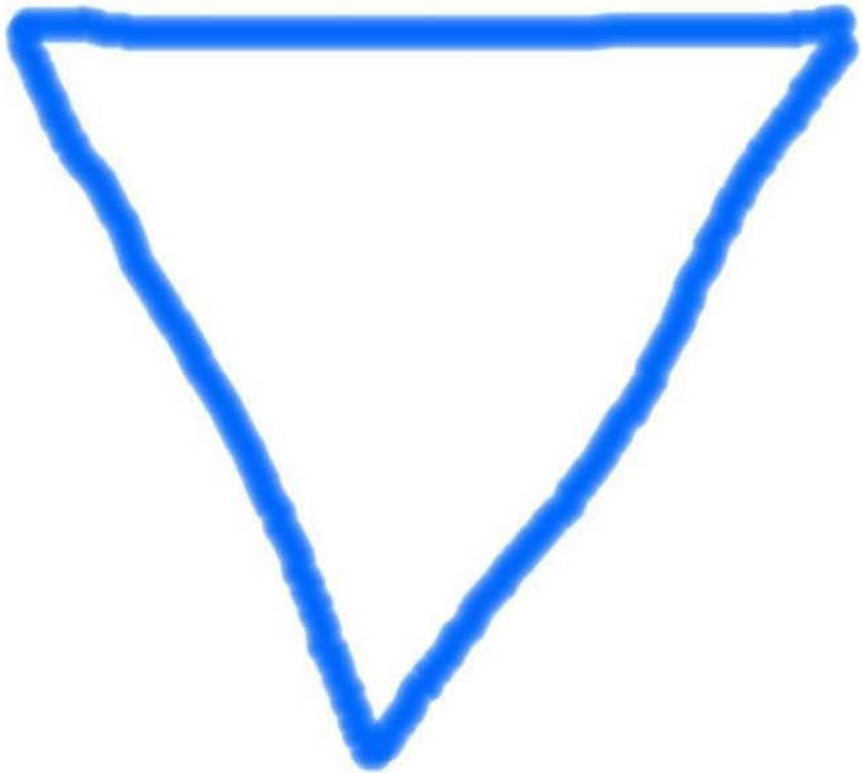
dense


Continuous or discrete
Continuous
Discrete
Dense
Discontinuous
Dense and discontinuous


difference
identity

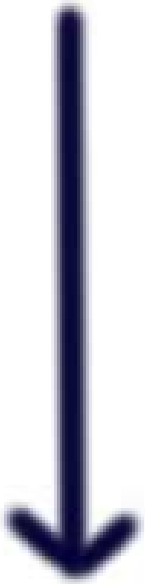
Identity

Difference

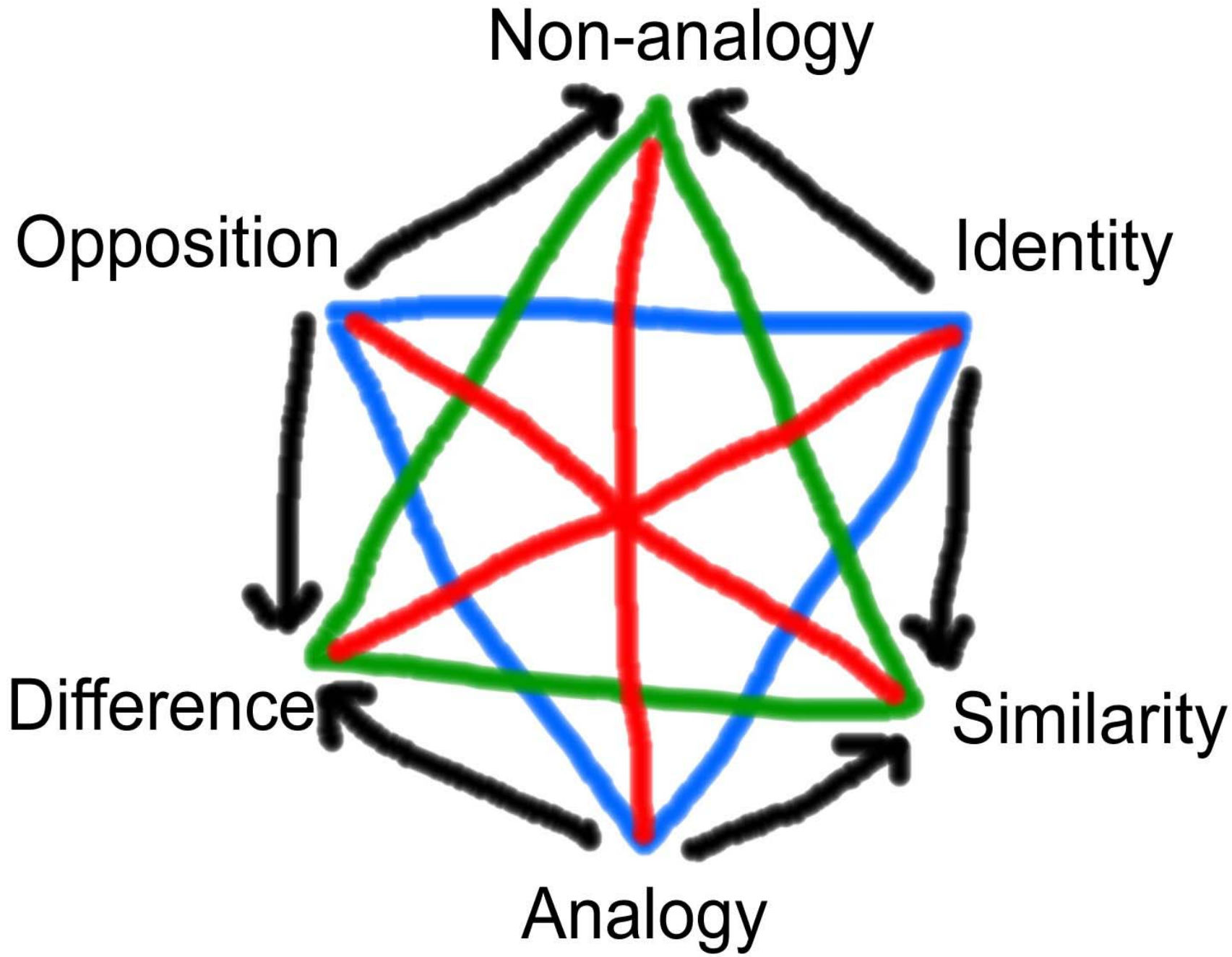


?

opposition

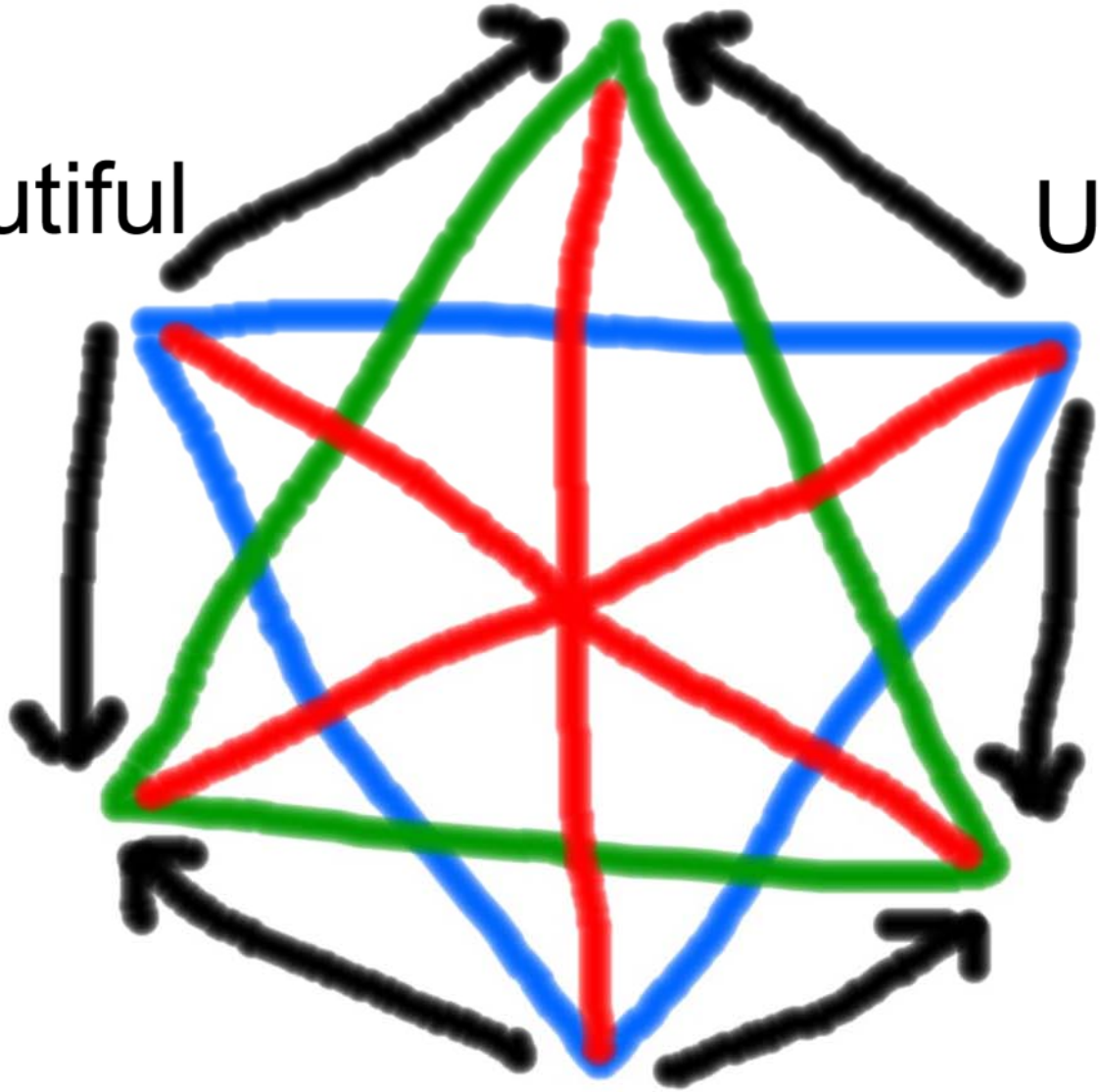


difference

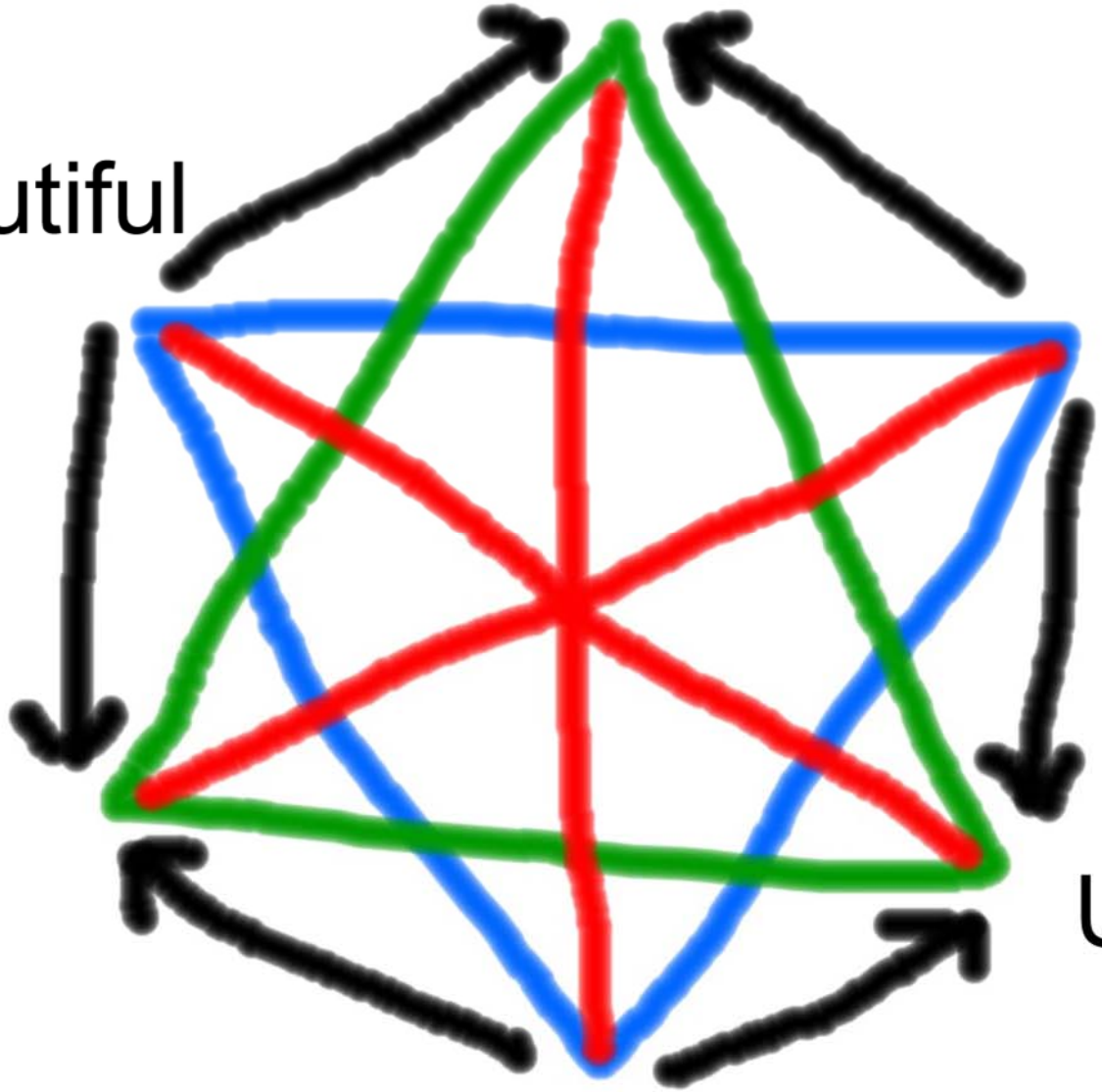

Non-analogy
Opposition
Identity
Difference
Similarity
Analogy

Beautiful

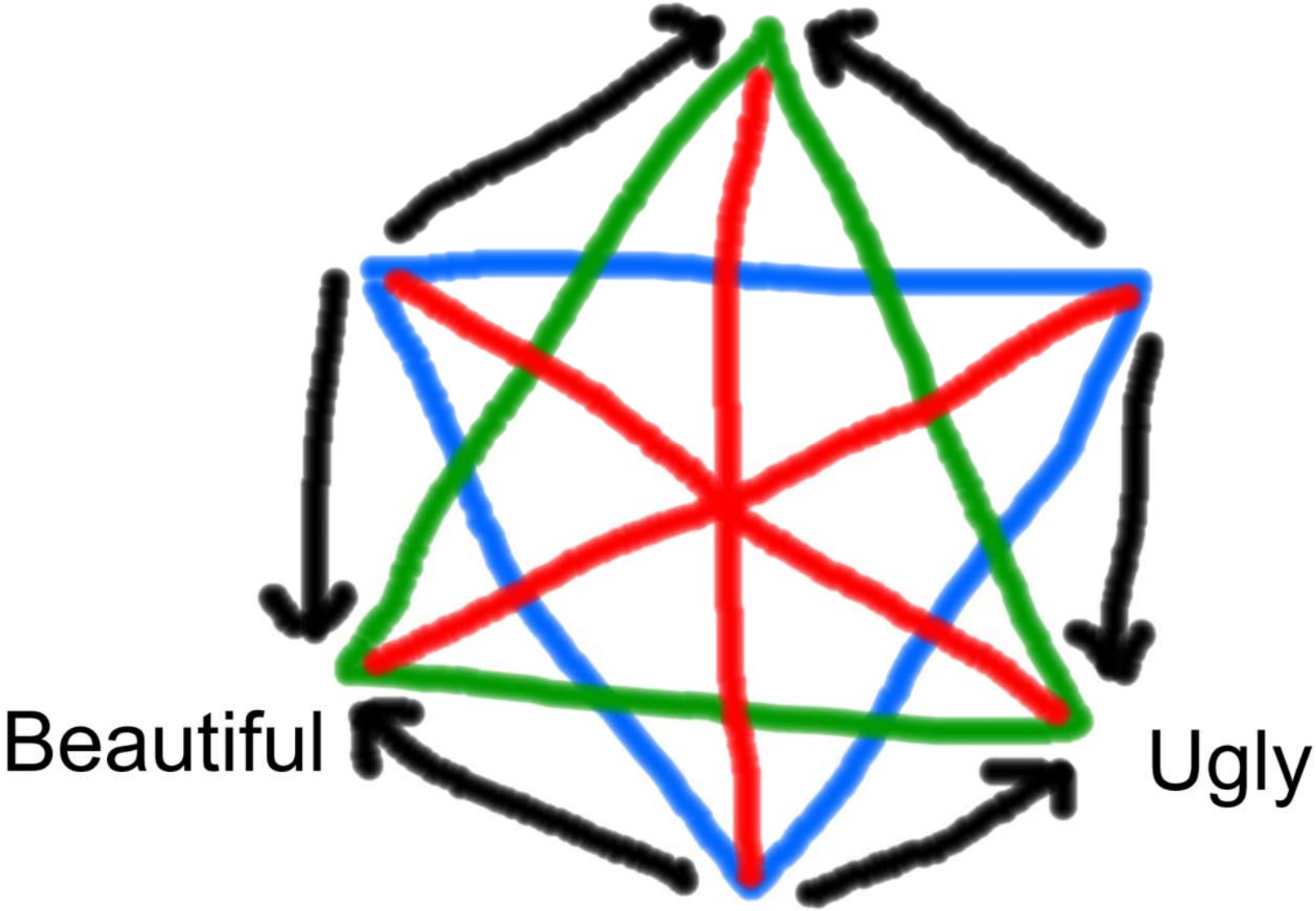
Ugly



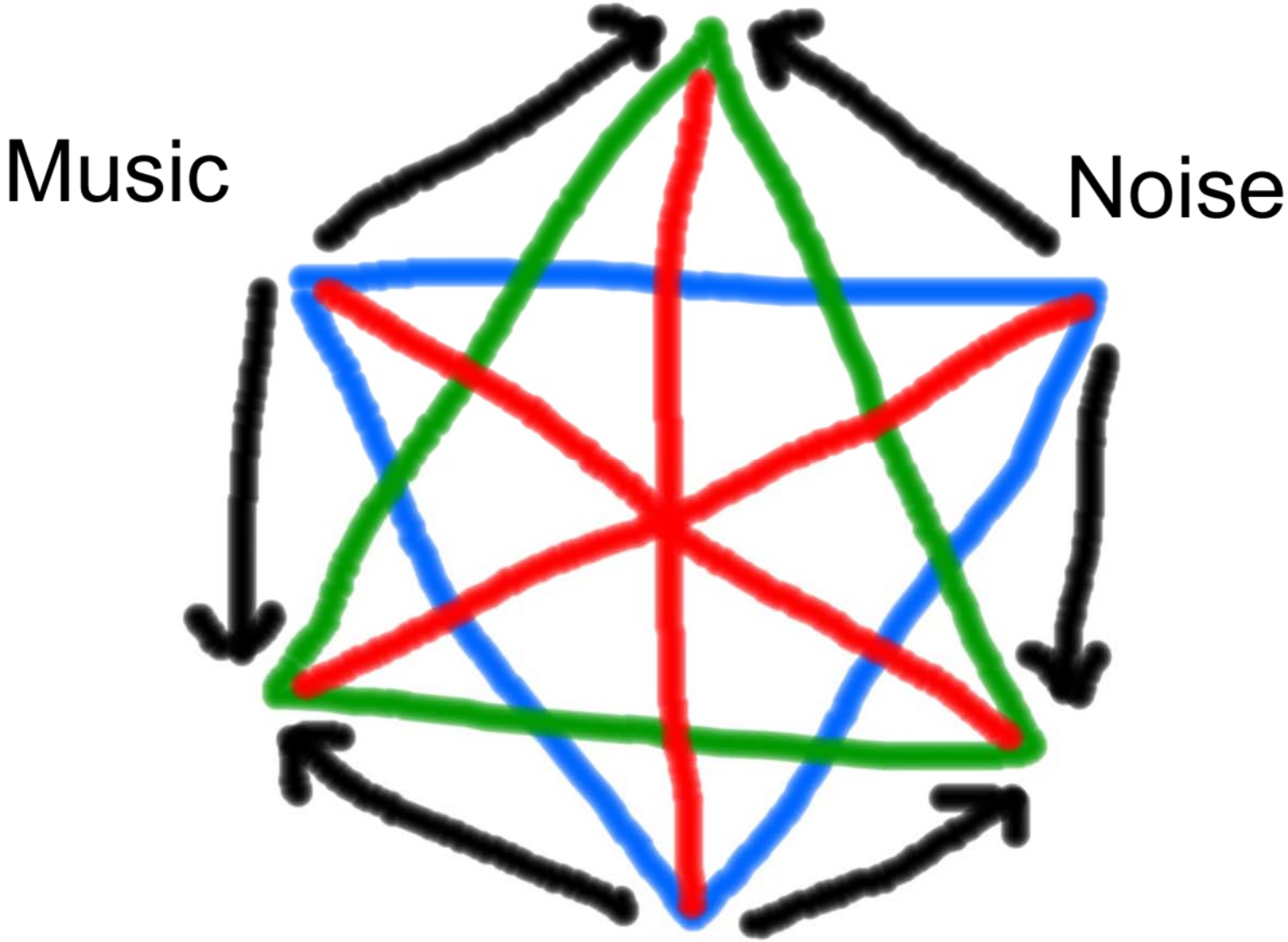
Beautiful

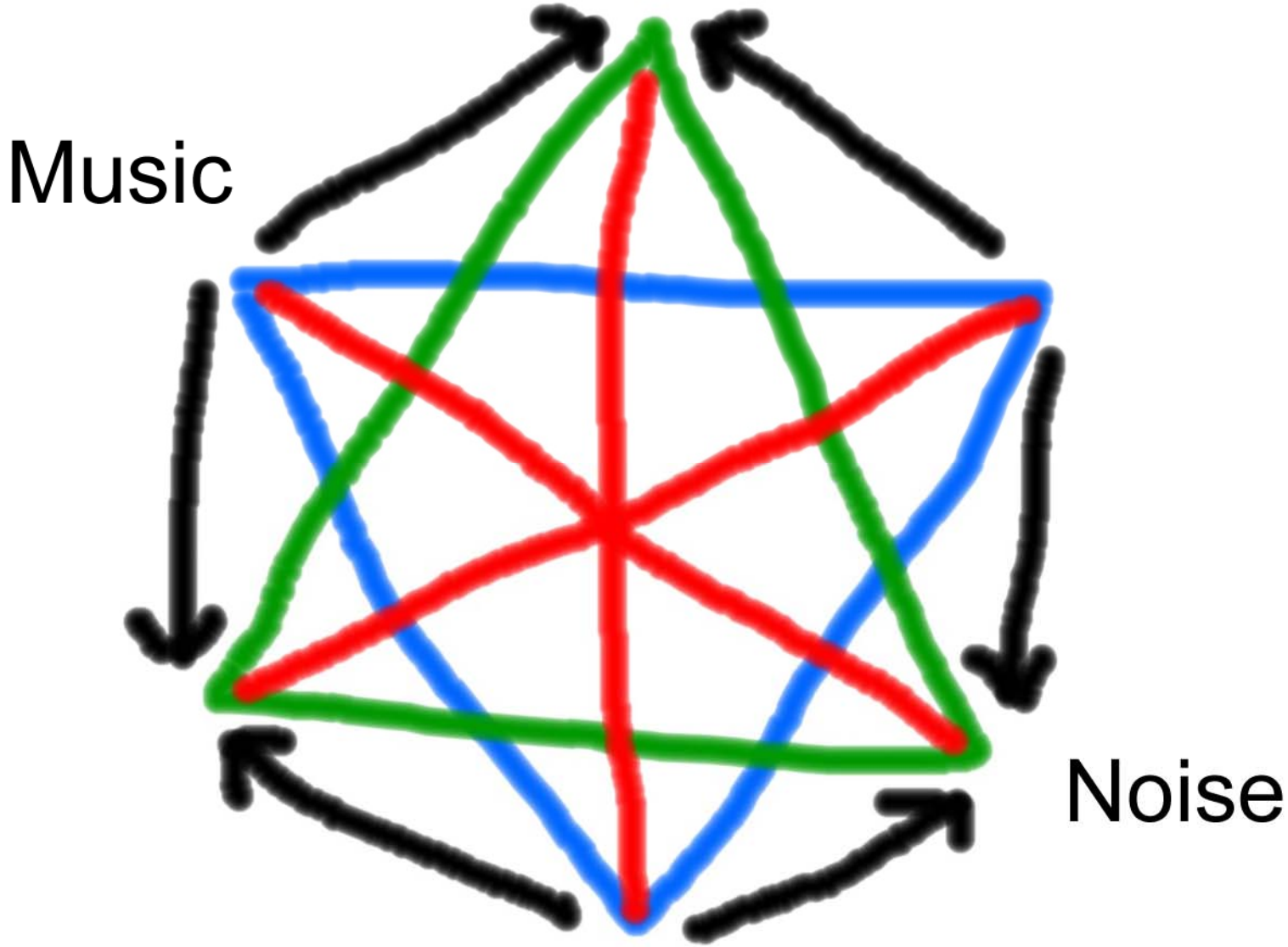


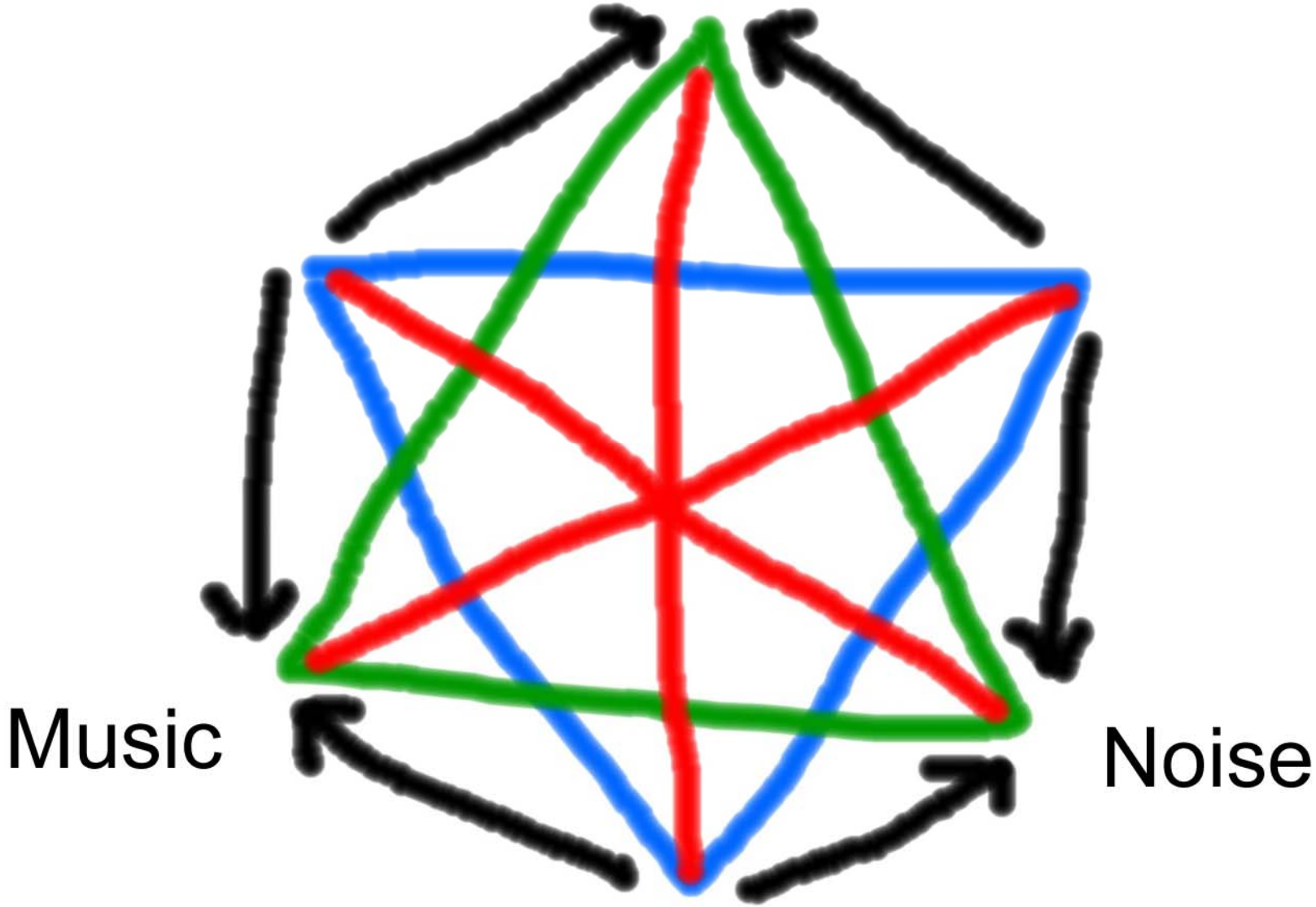
Ugly

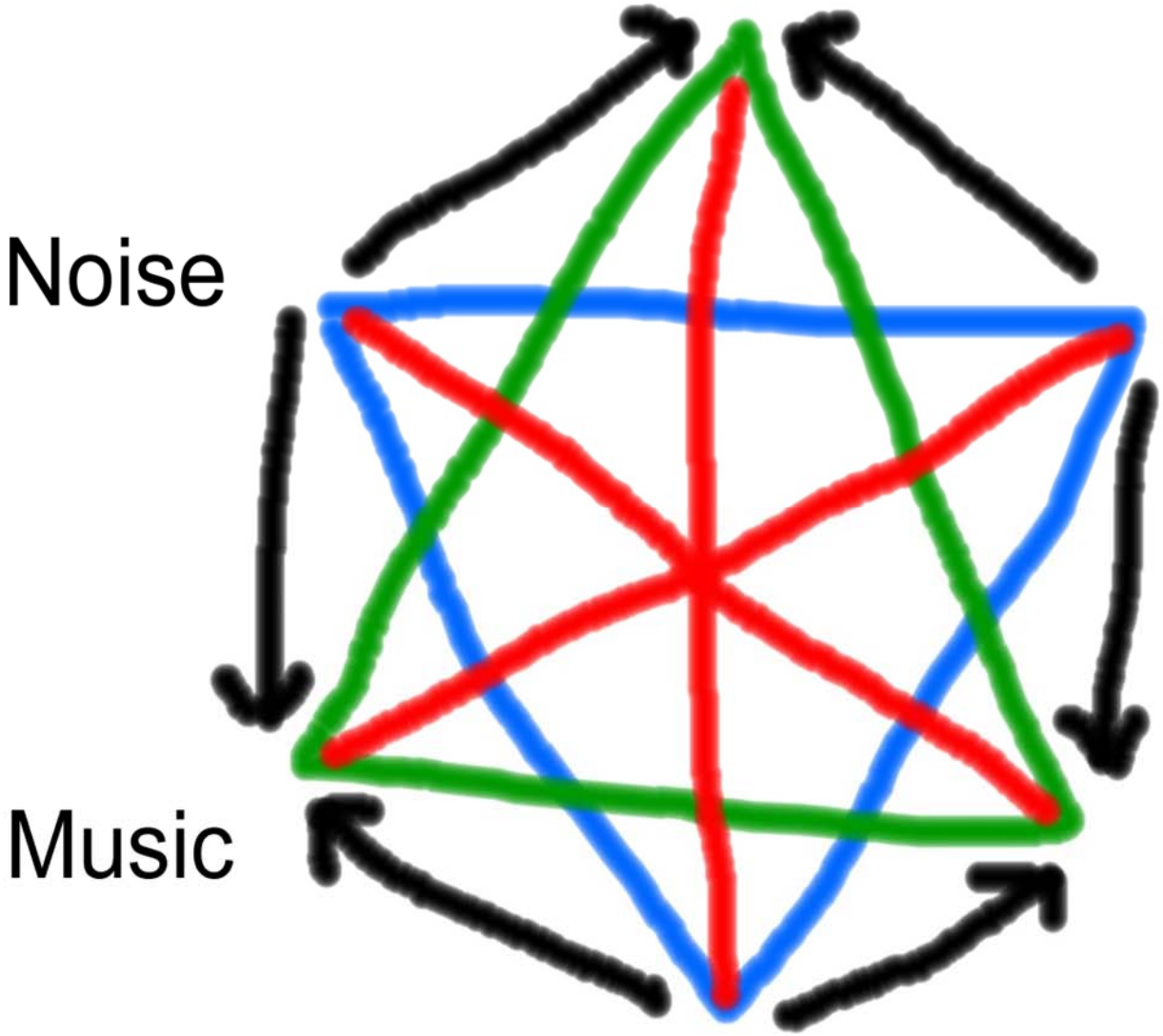

Beautiful
Ugly

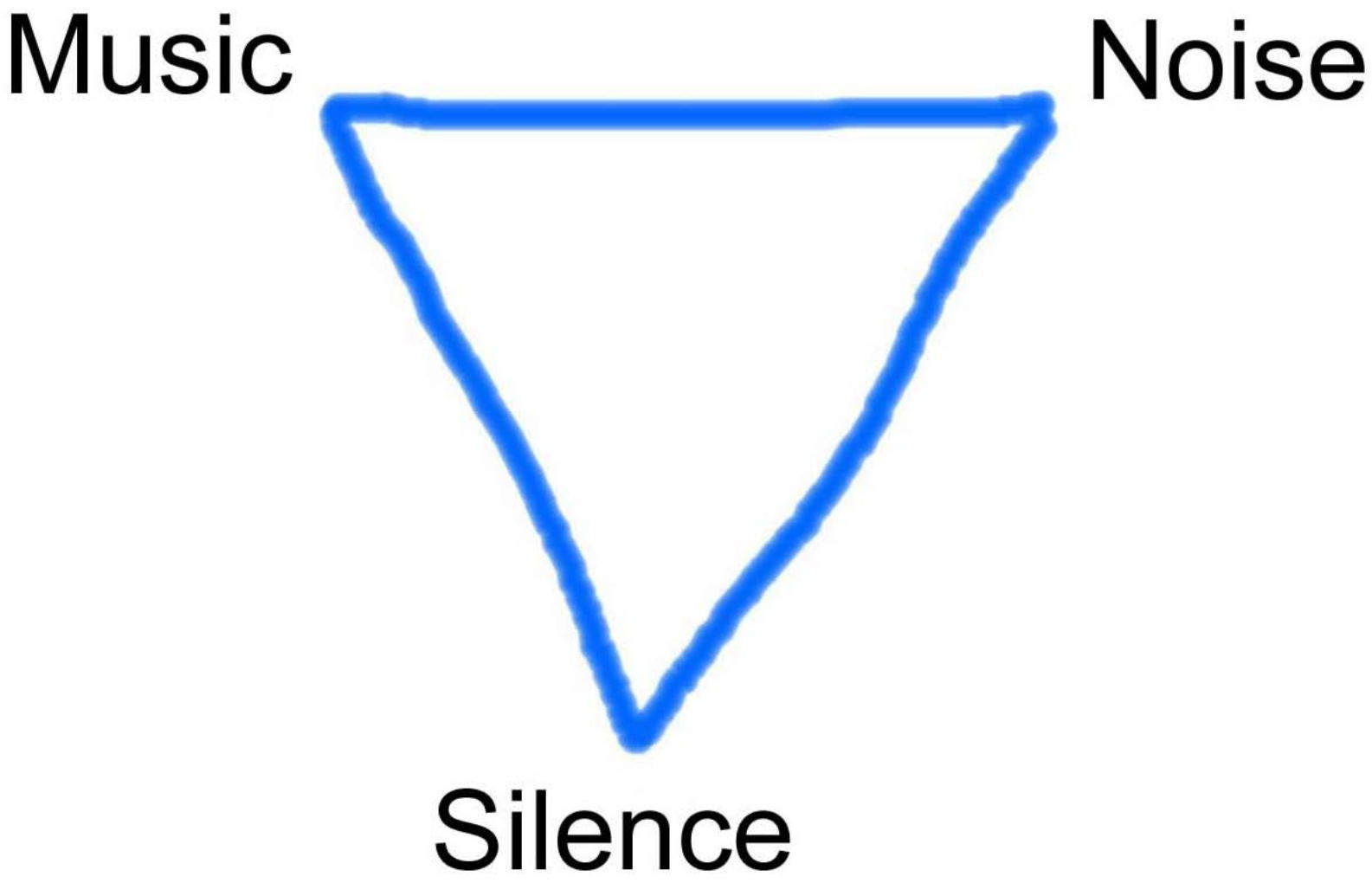
Musical Hexagon


Music
Noise


Music
Noise

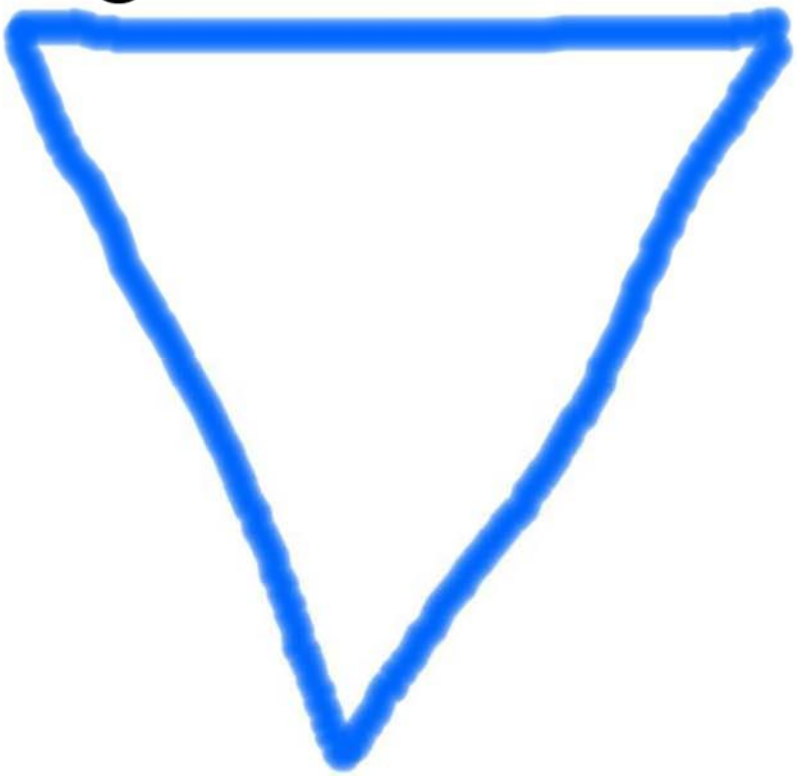

Music
Noise


Noise
Music


Music
Noise
Silence

Everything

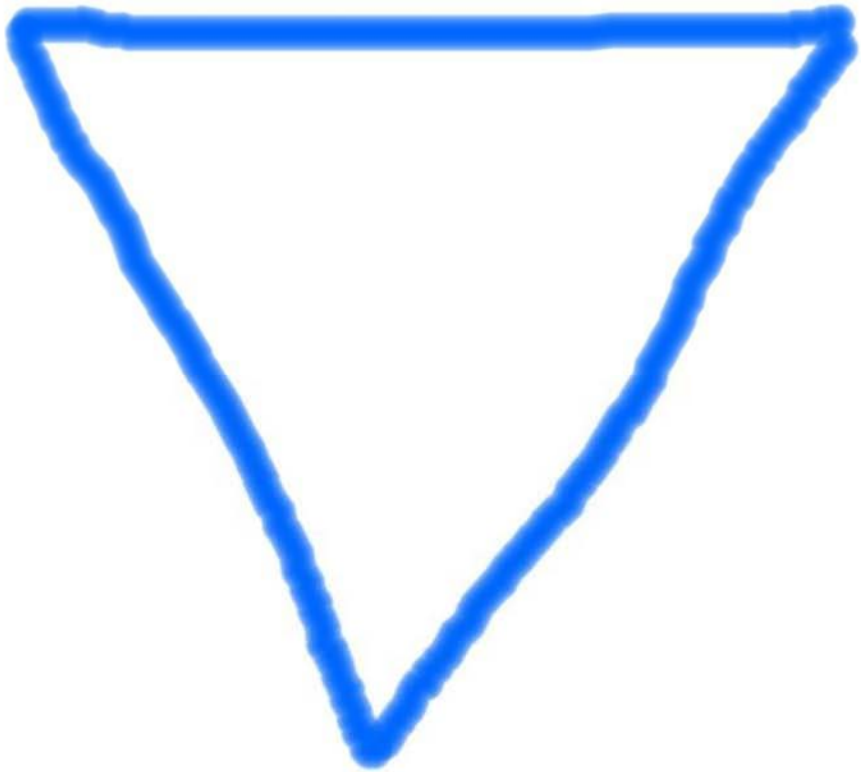
Something



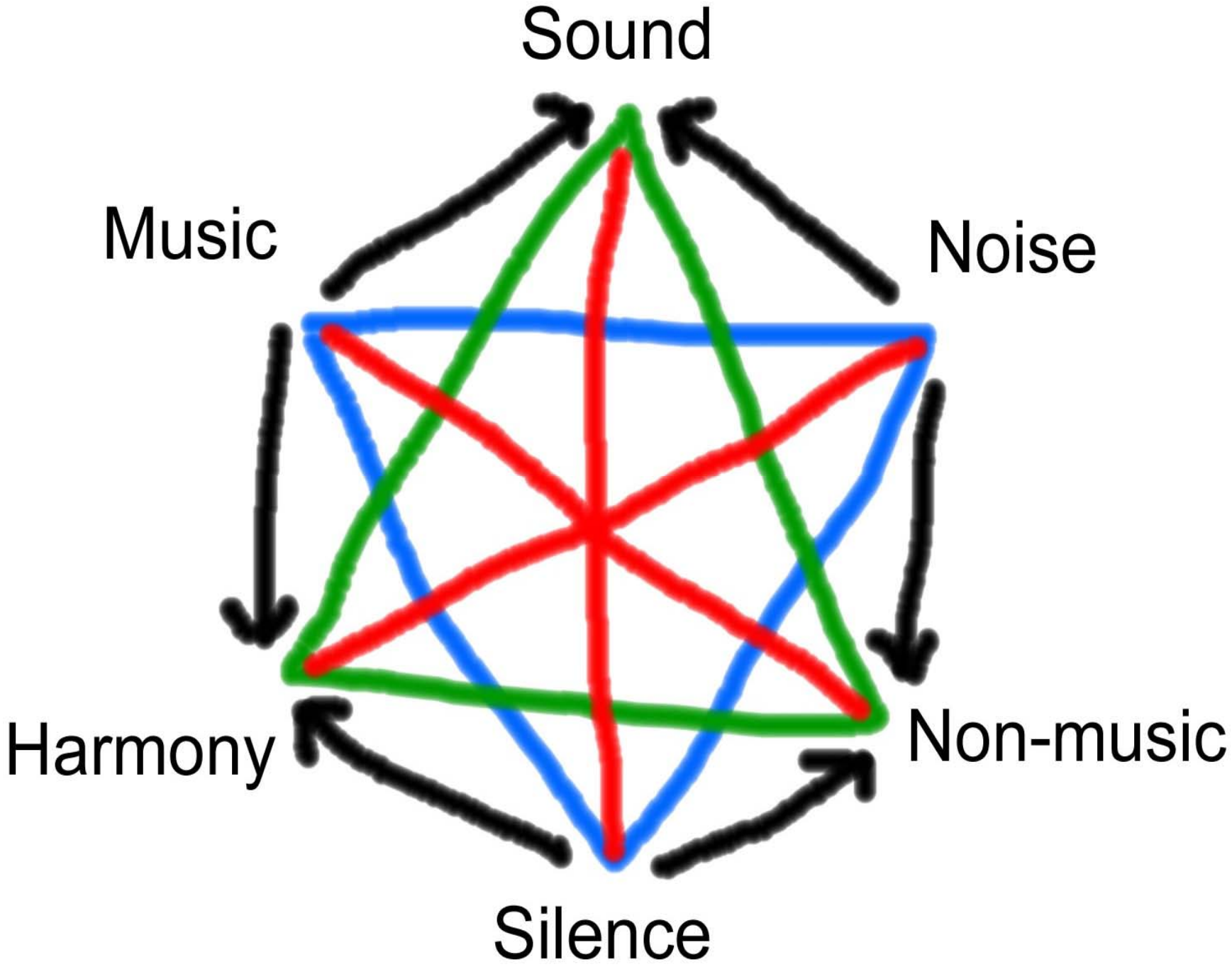
Nothing

Pleasure

Suffering



Indifference


Sound
Music
Noise
Harmony
Non-music
Silence